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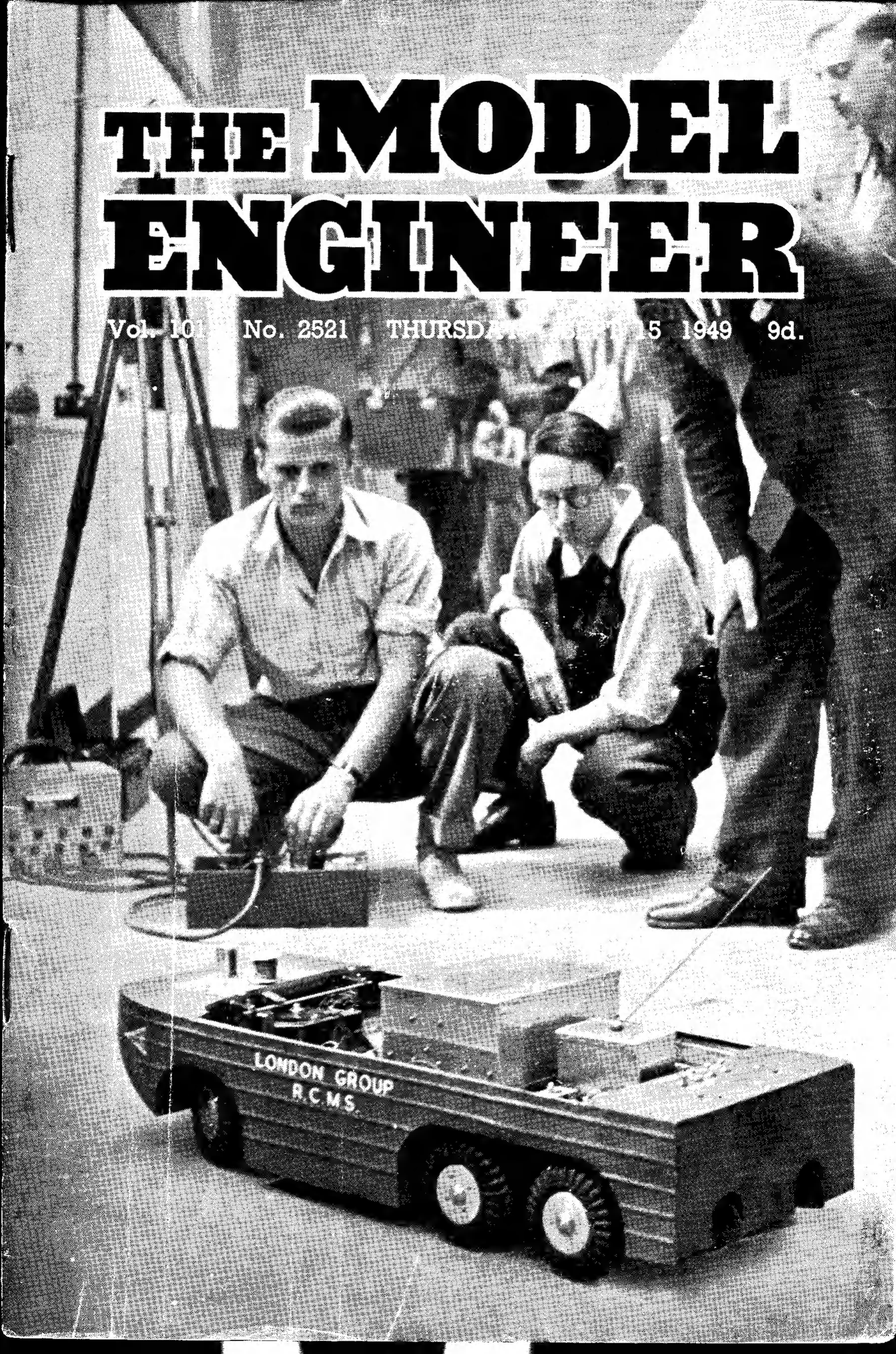


The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

15TH SEPTEMBER 1949 VOL. 101 NO. 2521

SMOKE RINGS

Our Cover Picture

● SOME TIME ago, we commented on the progress of amateur experiments in radio control, and described demonstrations on model power boats under radio control at various club regattas. A still more striking demonstration of the progress in these experiments was given by the Radio Controlled Models Society at the "M.E." Exhibition. This Society staged demonstrations at frequent intervals during the course of the Exhibition in which two model vehicles, the "Landrover" made by the Manchester Group, and the DUKW made by the London Group, proved to be among the most popular features of the Circular Track. The model DUKW, in particular, was shown to be remarkably controllable, and piloted by remote control by Mr. Cummins, performed some very spectacular manoeuvres, including steering through narrow openings, both ahead and astern, and the evasion of closely-spaced obstacles.

The method of control from the transmitter was extremely interesting, and incorporated the use of a steering wheel, speed regulator, and reversing switch, for the control of the impulses which actuated equivalent functions on the receiving apparatus.

On the stand of the Radio Controlled Models Society were further items of interest, including a radio-controlled power boat, and various items of equipment; also, a very fine example of the "Seal" engine, made by Mr. Cummins, which is at present being used in connection with radio-control experiments. The ready starting and manoeuvrability of this engine was a revelation to many visitors, and no less remarkable was its quietness, slow tick-over and prompt acceleration.

Unerring Craftsmanship

● THE FACT that the ship models in the "M.E." Exhibition, this year, were more numerous than ever has been referred to elsewhere; but when we came to examine them in detail, we discovered that the standard of craftsmanship was of a generally higher order than in any other section of the show. This will be discussed in greater detail in due course; for the moment, we have been thinking that, when all is said and done, the model in which every prototype detail is reproduced exactly to scale and, therefore, in correct proportion, is really the most satisfying. The idea that life is not long enough to permit this sort of thing to be usual, seems to lose its point when we come face to face with an individual who specialises in making the most perfect miniature ships, and thinks he is doing very badly if he fails to produce at least one per annum! Such people show us that what may almost be regarded as absolute perfection *can* be achieved; and this, in turn, suggests that it should be at least the ideal for all of us, no matter what we model. Yet, how few of us seem even to consider it!

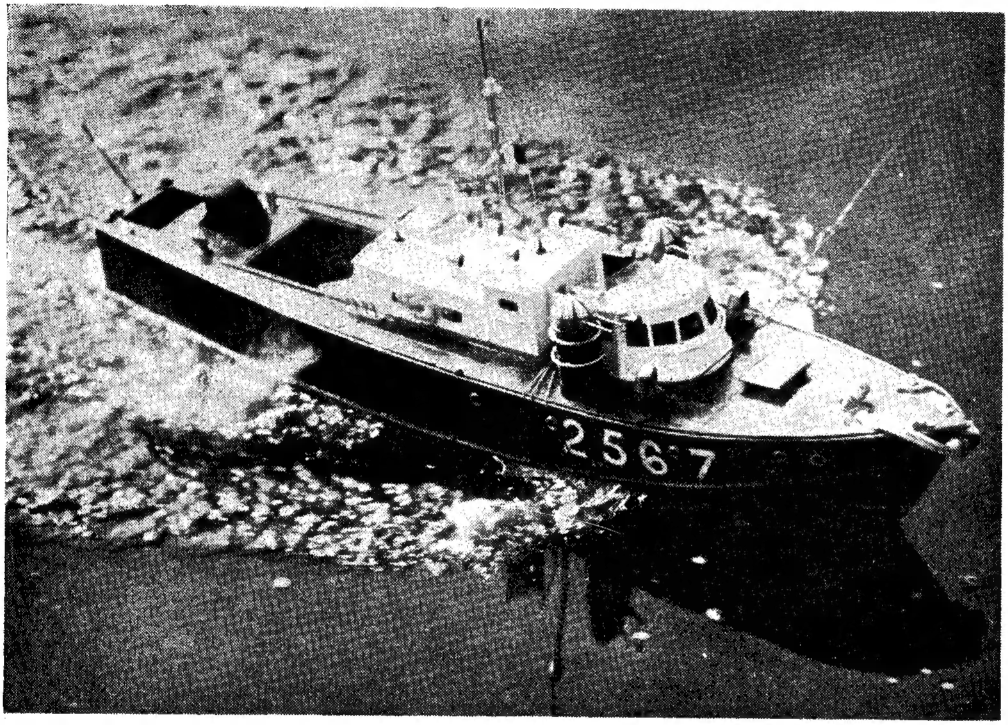
Progress at Crosby

● ARISING OUT of a recent "Smoke Ring" announcing the formation of the Crosby Model Club, the hon. secretary, Mr. Charles Williams, has written to us again to report excellent progress. The club has held its eleventh meeting, enrolled its 27th member, re-roofed its workshop, equipped it with fluorescent lighting and installed a lathe. At a local horticultural show, the club "assisted" by providing a "live steam" track, a 4-mm. scale working model railway and heaps of enthusiasm. The Crosby Borough Parks Committee has co-operated by giving permission for the club to have exclusive use of the pond in Coronation Park on Wednesday evenings during the summer; but, as a special favour, the use of the pond was granted on the afternoon of Saturday, July 9th, to open the season.

This "launch" was a great success, and the local newspaper described how a hydroplane and a model R.A.F. air-sea rescue launch lapped the guide pylon at incredible speed, yet not without grace and obvious evidence of sea-worthiness. If the reproduced photograph of the rescue launch at speed is any criterion—and it is one of the best photographs of its kind that we have ever seen—the reporter's description is fully justified.

Finally, a tug and a cabin cruiser, while not so speedy as the two previously-mentioned boats, behaved extremely well and suggested their prototypes in every detail.

Crosby has certainly made a most auspicious start, and we wish the club all possible future success.



Information Wanted at Derby

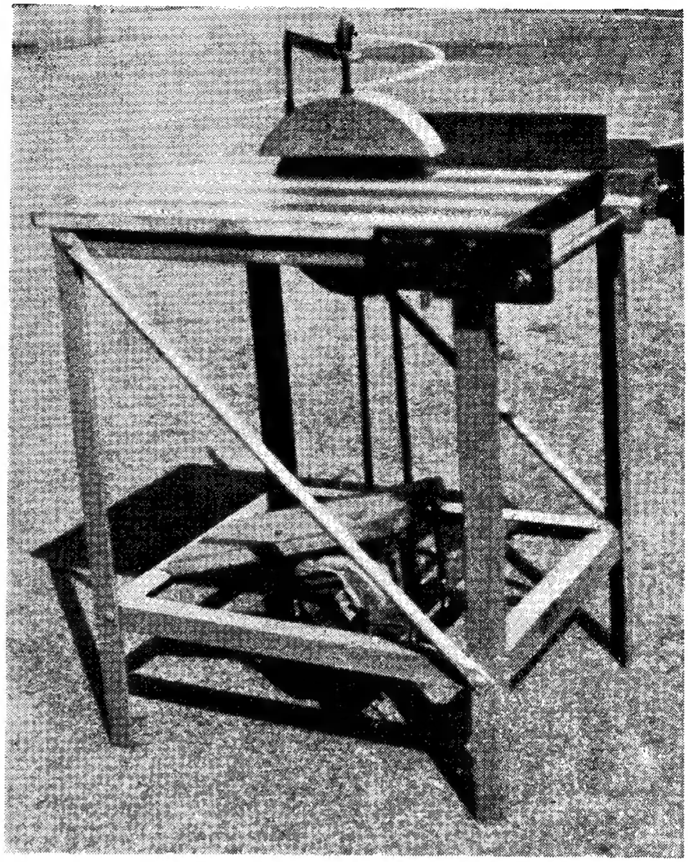
● FURTHER TO our recent note referring to the model of a section of the old Midland Railway which the Derby Society of Model and Experimental Engineers has undertaken to construct for the proposed Industrial Section of the Derby Museum, we have received a letter from the Curator of the Museum, Mr. A. L. Thorpe. With particular reference to the model, he writes: "This exhibit will comprise a running layout with fine scale models, as well as larger stationary models of important historical prototypes of M. R. locomotives, rolling stock, etc.

"For use during the building of this exhibit, and to form a valuable reference library for future students, we are seeking books, articles in technical journals, drawings, photographs, old time-tables, railway bills, etc., etc., illustrative of the Midland Railway, and it seems likely that some of your readers might possess such which they would be willing to give—in some cases, the Museum would consider purchase—or, in the case of drawings and pictures, allow photographic copies to be made. I should be grateful if anyone willing to co-operate in this way in our scheme would communicate with me."

Communications should be addressed to: The Curator, County Borough of Derby Museum and Art Gallery, Wardwick, Derby.

A 10-in. Saw Bench

by A. Smith



Left-hand side of saw. Note easy accessibility of switch

A DISLIKE of the hard work necessary in ripping timber boards for my many woodwork jobs resulted in the purchase of a 10-in. circular-saw blade. Unfortunately, although the spirit was willing, the flesh was weak, and time could never be found (or made) ! to settle down to thrashing out a design based on the blade and a 1/3 h.p. electric motor which I had already earmarked to supply the motive power.

The possibility of having an opportunity in the near future to build a new outdoor timber workshop settled the matter. That saw just had to come, and, what is more, had to be as portable as possible, while still possessing good rigidity.

The framework was made from 1½-in. × 1½-in. × ¼-in. angle iron. The top and bottom rails are mitred and the whole thing joined together by ¼-in. B.S.W. nuts and bolts. In this form the structure was capable of being pushed out of square. This was remedied by fixing a diagonal on each side. These diagonal members were formed from ¾-in. o.d. gas pipe, the ends being flattened and held by the bolts holding the framework. They are fitted so as to be in tension when timber is pushed into the saw.

The motor platform is a piece of beech, 15 in. long × 6½ in. × 1 in., on which the 1/3 h.p. motor is bolted in the inverted position. This was necessary owing to the motor design which has the lubricators underneath. It also assists in keeping sawdust away from the motor.

One end of the motor platform is hinged to a lower end rail. The other end rests on the heads of two 6-in. × ⅜-in. B.S.W. adjusting bolts which relieve the V-belt of the weight of the motor after the required belt tension has been obtained.

The saw table is made of alternate strips of red and white beech, each measuring 22 in. long × 2 in. × ⅞ in. Both sides of each piece, apart from the outer two, are ploughed ⅜ in. wide by ⅜ in. deep, and the whole top glued up with loose tongues. The position of the saw shaft was marked out, and the saw slot, ¼ in. wide × 9½ in. long, was cut with a ¼-in. mortise chisel.

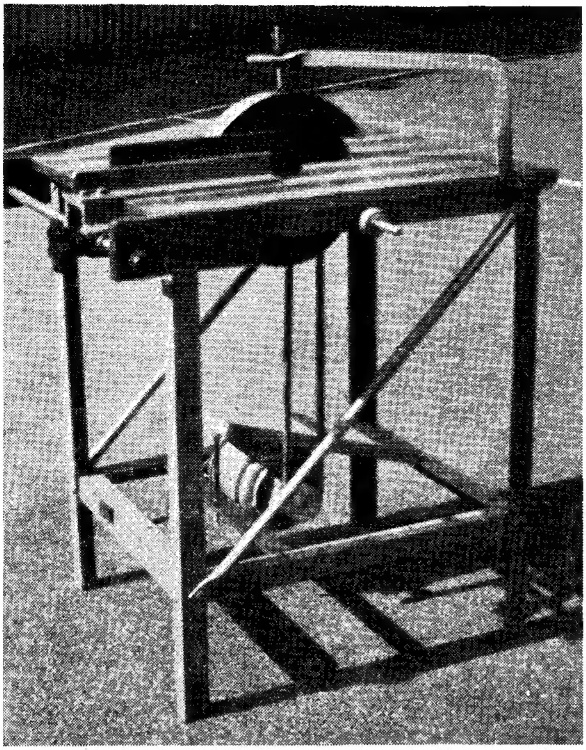
It was essential that the bench top be as smooth as possible, therefore the heads of the bolts holding it down to the framework were sunk halfway through the thickness of the top, the holes then being plugged with hardwood dowels to conceal the bolt heads. Both ends of the top were banded with ⅞-in. × ⅛-in. brass strip fixed by ¾-in., No. 6 countersunk-head brass screws.

The saw-shaft and bearings is an assembly obtained from an "M.E." advertisement. It consists of diecast bearings bushed with oilite bronze. The ⅝ in. diameter shaft is reduced at both ends to ½ in. and carries washers and nuts for fitting a saw blade and a grinding wheel. The bearings and shaft were mounted beneath the bench top, and a clearing hole drilled in the right-hand top side member, through which passes the shaft end which carries the grinding wheel.

The fence-supporting brackets are also of beech, 8½ in. long × 3 in. wide × 1 in. thick,

and are screwed, one on each side of the bench top by three $1\frac{1}{2}$-in. No. 10 countersunk - head steel screws. The left-hand bracket is cut away to clear the combined switch and three-pin socket. The bearing brackets are bored $\frac{3}{4}$ in. to carry the fence-guiding shaft, a 24 in. length of $\frac{3}{4}$ in. diameter B.D.M.S. Each end of the shaft is threaded $\frac{3}{4}$ in. × 18 t.p.i. and is nutted on both sides of the beech supporting brackets with $\frac{3}{4}$ in. conduit lock-nuts.

The fence was made from a 12 in. length of $1\frac{1}{2}$ in. × $1\frac{1}{2}$ in. angle bolted to the underside of an old lathe headstock made many "moons" ago. The headstock has a centre height of $2\frac{1}{4}$ in., thus it was necessary for the axis of the fence guide shaft to be $2\frac{1}{4}$ ft. below the table top. The headstock is, of course, upside down.



Note protruding end of shaft to take grinding wheel

In passing, it is interesting to note, that the bearings of this headstock were $\frac{3}{4}$ in. bore phosphor-bronze bushes obtained from an old magneto.

The fence is locked in position by a $\frac{3}{8}$ in. B.S.W. screw threaded through a headstock limb and pressing a brass pad on the guide shaft. To the outer end of the screw a 3 in. diameter plastic handwheel is fitted by a taper pin. A $\frac{1}{2}$ in. piece of beech is screwed to the fence to act as a surface against which the timber being sawn may bear. The fence may be swung down, out of the way, when very wide pieces of timber or plywood sheets are being sawn.

The guard is made from 16-gauge steel and is $1\frac{1}{2}$ in. wide by 3 in. deep. The side-piece has a $\frac{1}{4}$ in. flange formed on its upper curved edge to which a $1\frac{1}{2}$ in. wide strip is riveted with $\frac{1}{8}$-in. × $\frac{1}{4}$-in. iron rivets. The arm was forged from a length of 1-in. × $\frac{5}{16}$-in. steel bar, and is screwed to the table edge. The guard is held and adjusted by a $\frac{3}{8}$ in. diameter rod threaded its full length.

All the metalwork is painted machine grey, while the woodwork has been liberally treated with linseed oil.

The saw will cut easily 1-in. thick hardwood, the whole machine being perfectly firm and steady, and requires no floor fixing even under maximum load. Needless to say, sawing timber has now become a pleasure, and every piece of wood within reach is in positive danger of being reduced to firewood.

For the Bookshelf

Newnes' Engineer's Reference Book. (London: George Newnes Ltd.) 1,600 pages. Illustrated. Price 45s. od. net.

This is the third edition of a valuable book of reference for any information likely to be required by all engaged in mechanical, civil, structural, automobile and aeronautical engineering. Since the previous edition was published two years ago, some 300 pages, covering 29 new subjects, have been added.

Mathematical and physical tables and formulae, together with numerous examples of their use, form a prominent feature; drawings, diagrams and graphs are provided in profusion, and there are even chapters dealing with psychological problems met with in factory organisation and routine.

Typical sections deal very fully with thermodynamics, hydraulics, workshop mathematics, drawing-office practice, patents, designs and trade marks, metallurgy and foundry practice, together with every process known in the engineering profession. In short, the book is a *vade mecum*.

A Small Lubricating Pump

by J.K.M.

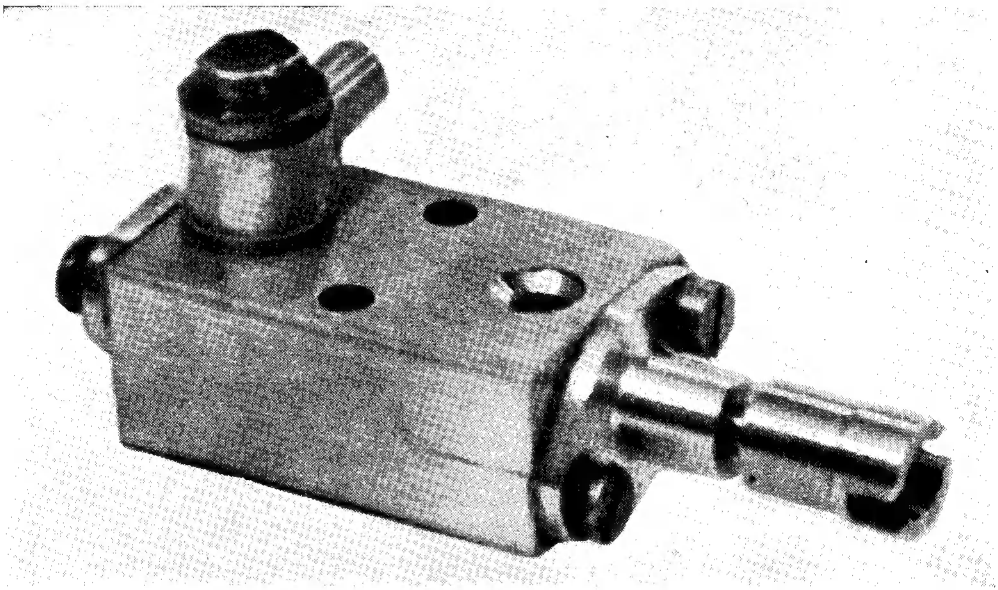
THE pump which forms the subject of these notes was evolved as an answer to the little problem expressed diagrammatically in Fig. 3. The question arose with regard to maintaining a head of lubricating oil in a tank from which feed pipes were to deliver oil to the bearings of a small mechanism.

The arrangement is familiar enough. A tank T (Fig. 3) situated near the top of a small engine or other machine, supplies oil to the various bearings through the feed pipes F. The oil drains into a sump S, and is lifted back to the tank by the pump P. To avoid meticulous matching of the pump output with the amount of oil required by the machine, it simplifies matters to make the pump so that it is always master of the situation and arrange for an overflow pipe O to return the surplus oil to the sump.

In my particular case it was anticipated that the distance from the sump to the oil tank would be about 7 or 8 in. and that the tank would be about 3 in. long and about 1 in. wide by 1 in. deep.

The question arose with regard to designing a suitable pump. This had to be quite small—not more than about 2 in. in overall length—and for a number of reasons it was thought desirable to make it of the rotary type, running totally immersed in the oil. It will be seen that its duty would be very light; all that was required was that it should lift the oil through the specified height against atmospheric pressure. Another factor that I had to take into consideration was that the pump could conveniently be driven at about 1,000 r.p.m. and a reduction gear, to reduce this speed was undesirable.

After thinking the matter over (and discarding some of the designs to be found in motor-cycle oil systems as rather equivalent, in this instance, to employing a bulldozer to clear away a bucket-full of dust) I fastened on to the idea of the kind of pump which operates by means of a screw or worm. This seemed the simplest way of making a pump to do the job, there being only one moving part and very little to go wrong (see Fig. 4). The pump which was the final result of a few experiments and trials is shown in the reproduced photograph, and I venture to describe it and say something about its performance.



The finished lubricating pump

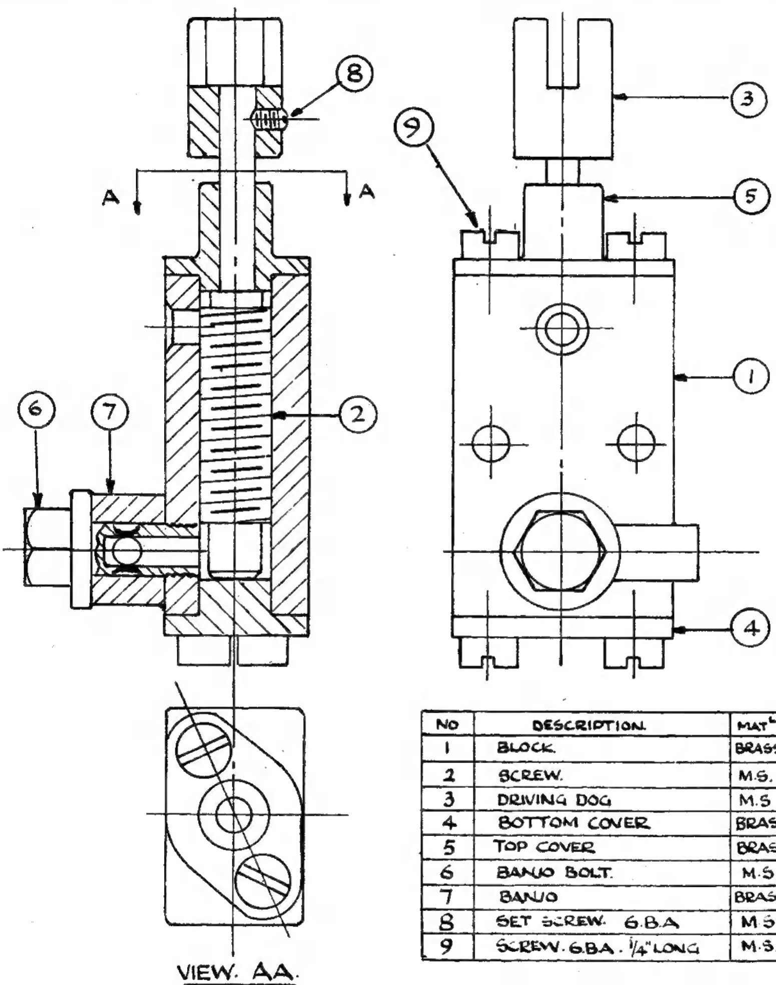
Working drawings are given in Figs. 1 and 2. It consists simply of a brass block (1) having an accurately reamed hole through the centre. Rotating in this hole is a screw (2) integral with a spindle which carries a driving dog (3). The block is closed at the bottom by a cover (4). and at the top by the cover (5). A hole drilled in the side of the block lets oil into the pump and an outlet is tapped 2 B.A. to suit a bayonet fitting for a $\frac{1}{8}$ in. diameter copper delivery pipe.

Fig. 5 shows how the pump will be installed

and it will be seen that the pump runs totally immersed in the oil.

Performance

After carrying out one or two experiments and finally making up the pump as shown, it was subjected to a simple test. This consisted of running the pump at various speeds and measuring the quantity of oil delivered. The results are shown in the graph (Fig. 6). I would not have readers believe that these results are very accurate, and I say this because I have felt that the expressing of a number of varying quantities in graphical form can sometimes give them an air of authority which is not always justified. On the other hand, I believe it is better to make an honest attempt to state what the pump will do, rather than just assure readers that oil comes out of the delivery port when the spindle is revolved. To make this matter perfectly clear, the quantity of oil delivered was measured by finding how long it took to fill a small circular tin lid. The diameter and depth of the lid was afterwards measured and its volume calculated. Similarly, the speeds are estimated as accurately as possible. A revolution counter was not used, nor was it possible to take a large number of readings because of the simple nature of the equipment employed.



NO	DESCRIPTION	MAT[L]
1	BLOCK.	BRASS
2	SCREW.	M.S.
3	DRIVING DOG	M.S
4	BOTTOM COVER	BRASS
5	TOP COVER	BRASS
6	BANJO BOLT.	M.S
7	BANJO	BRASS
8	SET SCREW. 6.B.A	M.S
9	SCREW. 6.BA. 1/4" LONG	M.S.

Fig. 1. Three views, one partly in section, of the small lubricating pump

Other information, additional to that given in Fig. 6 is as follows :

1. The oil used is a good quality light machine oil having, I think, a viscosity somewhat higher than that of "Oilet," "3 in 1" and similar oils.

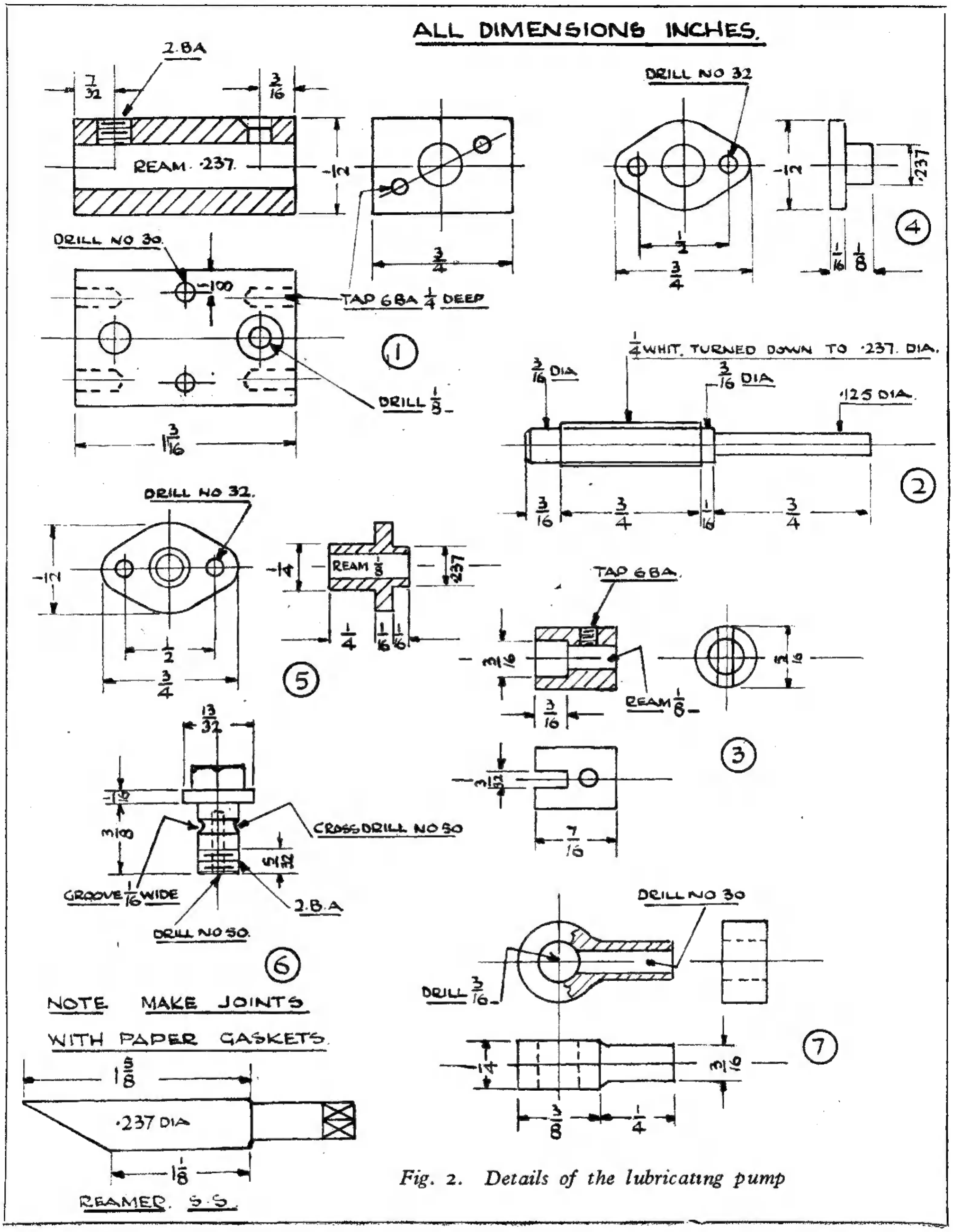


Fig. 2. Details of the lubricating pump

2. The delivery pipe was of thick-walled copper tube ⅛ in. outside diameter.
3. The pump would deliver oil to a height of at least 10 in. above the inlet port.
4. Inadvertent admission of air into the pump does not stop it working.
5. With a pipe soldered to the inlet port, it was found that the pump would lift oil from a level 3½ in. below it, this, of course, with the pump running in air. i.e. not immersed. Under these conditions, however, it was not reliable, and its working seemed to depend on it being properly primed.

The conclusions to be drawn from the results of the tests are as follows :

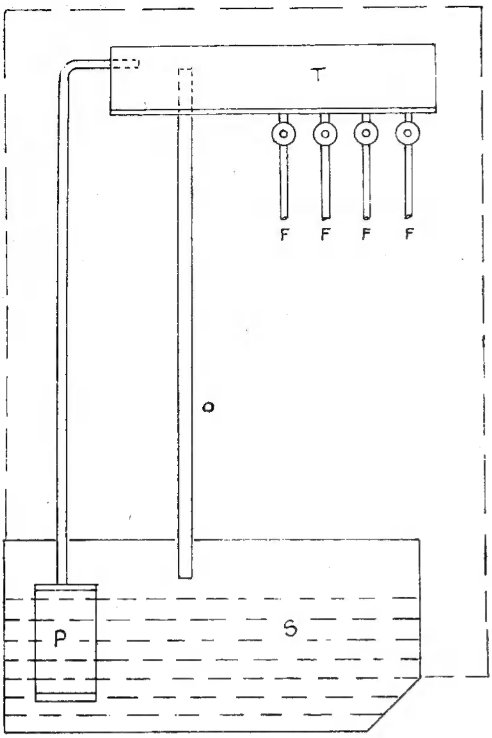


Fig. 3

(a) The output varies with the speed (see graph).
(b) The pump will lift oil to a height of 10 in. about the inlet port.
(c) It is unsuitable for the delivery of oil under pressure.
(d) It is unreliable when installed so that the inlet port is above the level of the sump.
(e) The pump would probably be useful for the oiling system of a small petrol, gas, or steam engine, although it would be unsuitable for the lubrication of steam engine cylinders. It would also be useful for the lubrication of other mechanism, such as small machine tools, etc.

Construction

The pump is very easy to make, and again referring to Fig. 4 it will be seen that a reamer is

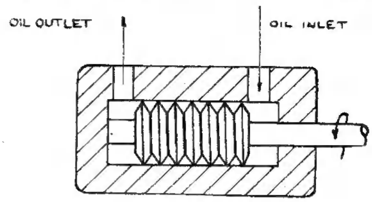


Fig. 4

required for the bore in the block (1). This should be made first by turning down a piece of silver-steel to 0.237 in. diameter, care being taken to get a good finish on the surface. Next, file the flat (really flat—the cutting action of the reamer depends on this). Harden and temper to a light straw colour, then sharpen on an oilstone, keeping the flat surface hard down on the stone to prevent "rock."

The block (1) can now be made. Hold the material in the four-jaw chuck, carefully centre drill, and face the end. Drill right through, with say, a $\frac{3}{16}$ in. drill, and open out the hole with a drill 15/64 in. diameter. Again open out the hole part of the way with the reamer, allowing this to go in just far enough to align it so that later on it can be put right through by hand. Before removing the work from the chuck, mark the end face with a centre punch—this face will assemble with the top cover (5). Next, reverse the work in the chuck and face the other end. The holes can now be drilled and the bore finish reamed. The screw or rotor (2) is simply a spindle having

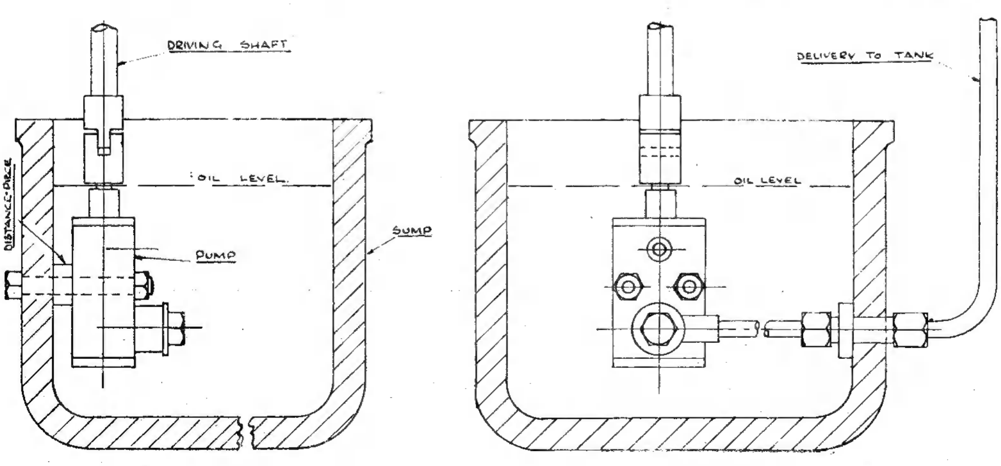


Fig. 5

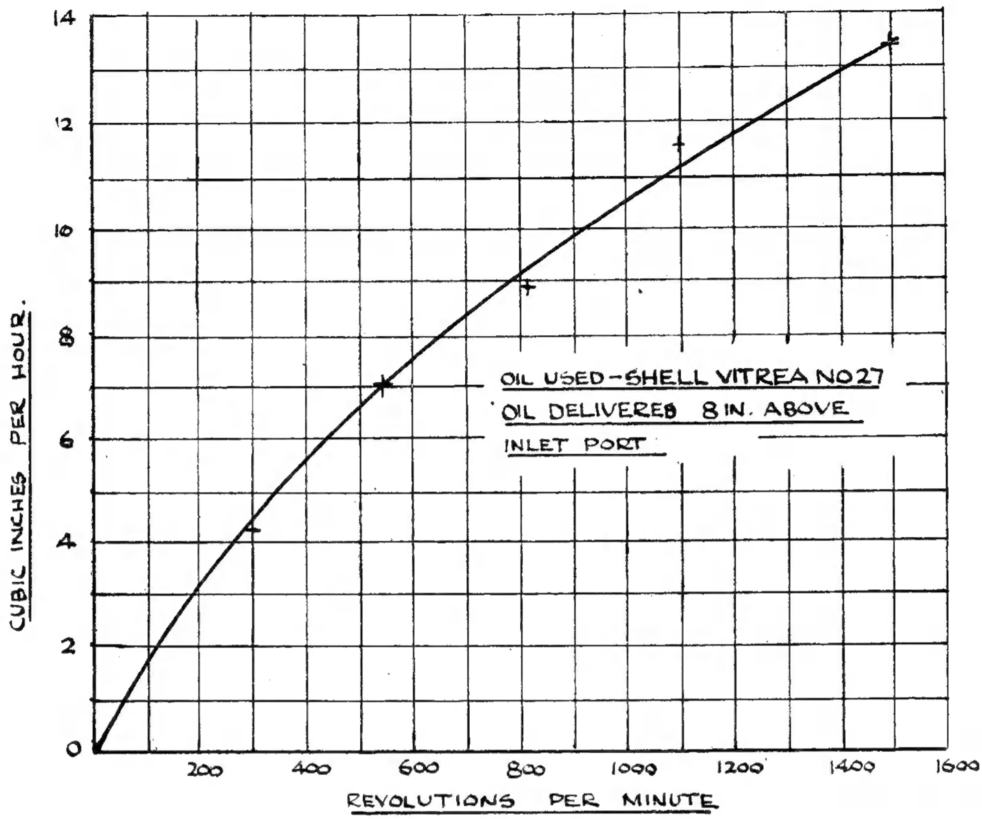


Fig. 6. Graph, showing results of tests

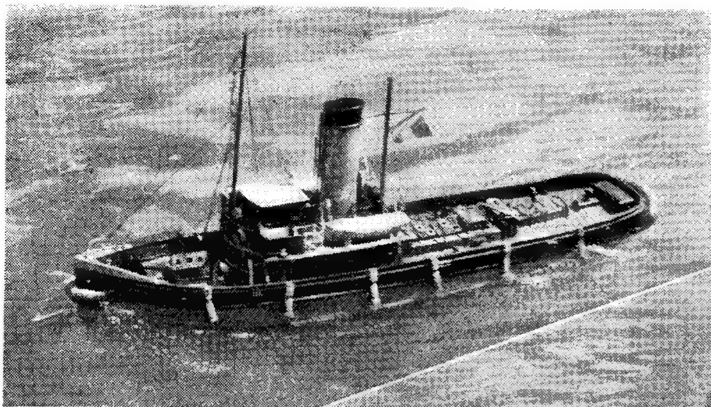
a ¼ in. Whitworth thread with the crests of the thread truncated to increase the bearing surface when running in the block (1). To make the screw, rough turn the various diameters, finish the threaded portion to 0.250 in. diameter and screw ¼ in. Whitworth. Finish the remaining diameters to size and lastly, using a fine feed, reduce the screwed part to 0.237 in. diameter so that it fits closely in the bore of the pump block. The rest of the work needs no comment. When assembled, there should be just a little end play in the screw, and paper joint washers should be fitted between the block and the covers.

Alterations to the pump will readily suggest themselves. For example, a modification to have the inlet port between the two No. 30 attachment holes would make it possible to fix the pump in an external position, and if it were fastened to the side of the sump, a hole could be drilled in the latter to line up with the inlet port. Another point, is, of course, that the method of driving the pump could be altered. I have found the driving dog, as shown in the drawings, satisfactory, but for greater reliability the 6 B.A. set-screw should be secured by deep centre punch burrs or by soldering.

Model Marine Engines on Show

WE think that many readers will be interested and pleased to learn that all four of the beautiful model marine engines built by Eng. Com. W. T. Barker and illustrated in past issues of THE MODEL ENGINEER, have been on view at the recent Engineering and Marine Exhibition, at Olympia. They were a most attractive feature on the stand of our esteemed contemporary, *Engineering*, where they could scarcely fail to impress all visitors who saw them. No better models could serve as "missionaries" for model engineering as a hobby.

The Guildford Regatta



Above. Mr. Evans's steam tug "Maycock"

Right. Mr. Morss starting "Belle Morss" in the nomination race

THE annual M.P.B.A. Regatta of the Guildford M.Y. & P.B. Club, held on Sunday, August 14th, once again attracted a large number of boats, competitors and onlookers to the pleasant surroundings of Stoke Park.

The Victoria M.S.C. were well represented, a large motor coach, and a lorry for the boats providing the transport. In addition there were good attendances from the following clubs: Malden, Blackheath, Orpington, Southampton, Bournville, S. London, and Kingsmere.

The regatta commenced with a nomination event for the steering boats, over a course of about 40 yd., and about 30 craft took their turn in running up the lake. The fine prototype models of the Victoria Club were much admired in this event, notably Mr. Eltridge's paddle steamer *Royal Sovereign*, Mr. R. O. Porter's *Slickery*, and Mr. A. Evan's tug *Maycock*.

The "guessing" proved to be not too good, many craft spoiling their nominations by not keeping to the course, an ominous portent for the steering competition!

The winner was Mr. Eltridge of the Victoria Club with *Royal Sovereign*, the runner-up Mr. Haggar's launch, also of Victoria.

	per cent. error
1st—Mr. Eltridge (Victoria) *Royal Sovereign*	1.3
2nd—Mr. Haggar (Victoria) ..	6.1

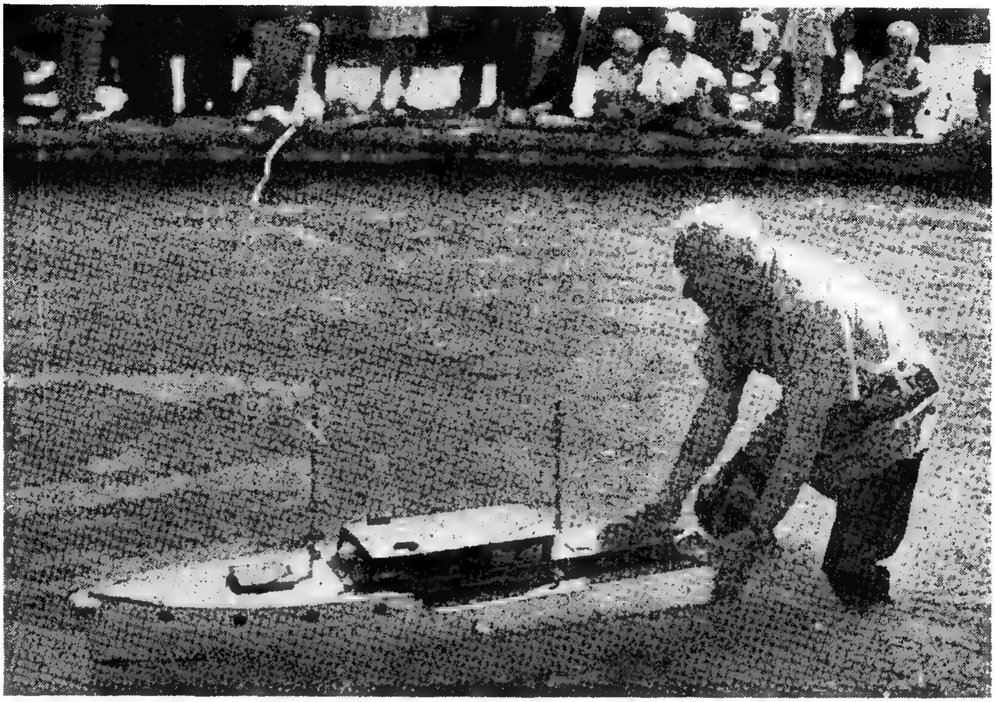
The steering competition followed over a similar course, but most of the boats contesting behaved most erratically. The steering course at Guildford *looks* to be an easy one, but in fact must be one of the most difficult courses of the various lakes and ponds used for power boating. The situation of trees, etc., causes different "windage" in different places, and a stream enters the lake at one side.

In spite of the number of crack boats present not one boat scored on all three runs, the winning boat, Mr. J. Benson's *Comet* (Blackheath) scored a miss and then hit the target on the two succeeding runs, scoring an inner and a bull, 8 points. The runner-up was Mr. R. O. Porter with *Slickery*, 6 points. A number of other boats scored 5 each including Mr. A. Rayman (Blackheath) last year's holder of the Guildford Steering Cup. This year is the third time in succession that this trophy has been won by the Blackheath Club, Mr. Benson winning it in 1947.

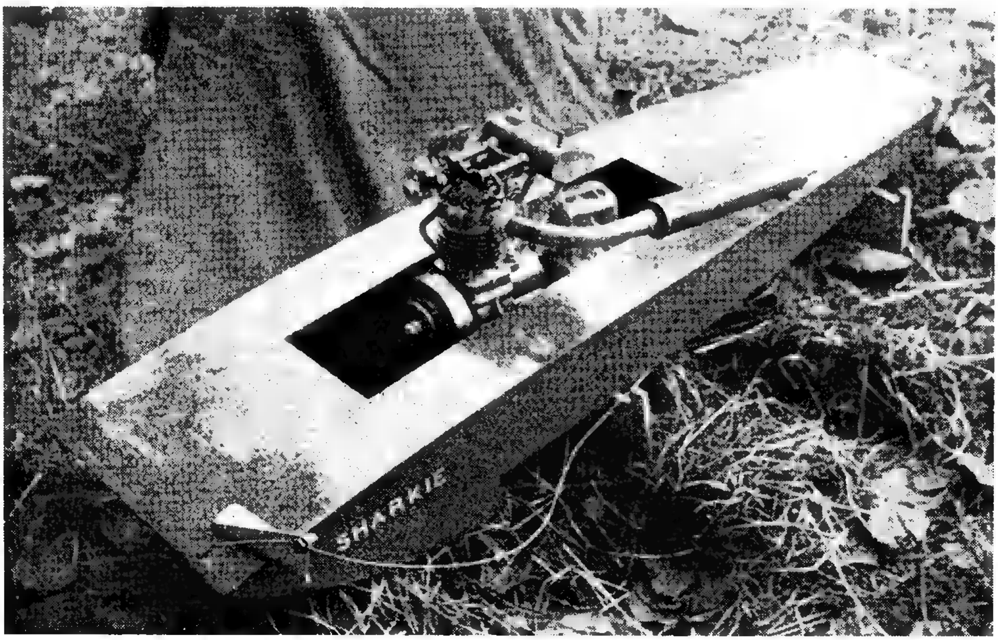
	pts.
1st—Mr. Benson (Blackheath) *Comet* ..	[illegible]
2nd—Mr. Porter (Victoria) *Slickery* ..	6

After lunch the events for the various classes of racing boats commenced with a Class A race over 600 yd.

This race produced eight entries, [illegible] well known and three new boats by Messrs. Fort (Victoria), Pantis (Southampton), and Porter



Mr. R. O. Porter starting his petrol-driven cabin cruiser "Slickery" in the Steering Competition



A promising new "B" class hydroplane "Sharkie," fitted with a 15 c.c. "Kittiwake" engine, by Mr. Collins (Victoria)

(Victoria), respectively. Mr. Fort's craft is a conventional scow hydroplane, engined with an ambitious overhead camshaft four-stroke, of huge dimensions. Mr. Pantis put up two clean runs with *Fire V*, a neat two-stroke engined boat of very clean design, while Mr. Porter failed to complete with *Dolu*.

Of the other boats the best run was made by Mr. B. Miles's *Barrucuda II* at 26.7 sec., followed only 1/10 sec. behind by Mr. Williams's *Faro*. Mr. Parris with *Wasp* (S. London) snatched at the line in a very erratic manner, probably due to the 75 yd. circuit used at Guildford.

	sec.	m.p.h.
1st—Mr. Miles (Malden) *Barracuda II*	26.7	45.5
2nd—Mr. Williams (Bournville) *Faro*	26.8	45.2

The next race was for B Class boats over a shorter distance, 300 yd., and four boats contested this, Mr. F. Jutton's *Vesta II*, Mr. G. Line's *Sparky*, Mr. A Martin's *Tornado V* and Mr. Collins' *Sharkie*, and the latter boat proved to be a dark horse, winning the event at 30.3 m.p.h. Mr. F. Jutton's *Vesta II* seemed a lot slower than usual, while Mr. G. Line's *Sparky* capsized on both attempts. Mr. Martin (Southampton) with his flash steamer *Tornado V* seems to be having a run of bad luck, and this boat failed to do anything spectacular.

	sec.	m.p.h.
1st—Mr. Collins (Victoria) *Sharkie*	15.6	39.3
2nd—Mr. Jutton (Guildford) *Vesta II*	15.8	38.8

The two Class C races were the last events again over 300 yd. In the first of these there were five "starters" but only one "finished"! The successful boat was Mr. B. Miles's 10 c.c. craft; the unlucky competitors were Messrs. Benson, Pinder, Weaver, and Cruickshank.

The Class C (restricted) provided a win for Mr. Phillips (S. London) with his McCoy engined boat, runner-up being Mr. A. Stone (S. London).

Class "C" race

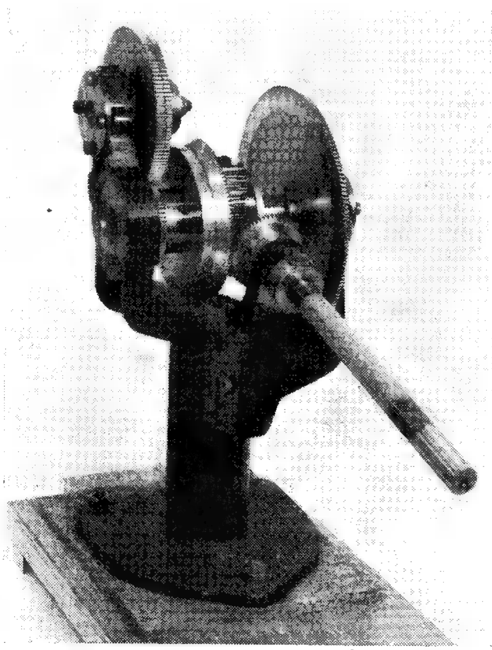
	sec.	m.p.h.
Mr. Miles (Malden)	24	25.6

Class "C" (restricted) race

	sec.	m.p.h.
Mr. Phillips (S. London) ..	16.5	37.2
Mr. Stone (S. London) ..	17.5	35

"Surplus" Instruments and Components

WE have examined a number of items of war surplus equipment submitted to us by Messrs. Aero Spares Co., 69, Church Street, Edgware Road, London, N.W.8, including components of control instruments such as differential elevation and azimuth transmitters. These comprise a number of very useful parts, which can be adapted to many model engineering uses. They each include a complete differential gear unit of the pinion type, with phosphor-bronze gears capable of standing up to heavy duty work in a model tractor or lorry. Several other spur and bevel gears in bronze and steel, some of them laminated and sprung to eliminate backlash, also shafts and ball-races, are incorporated in the units, the main frames of which are heavy bronze castings. The latter are shaped like the standard of a polishing and grinding head, and could quite easily be adapted for this purpose, using either the ball-bearings originally fitted, or replacing them with plain bushes to take a shaft of larger diameter.



The differential elevation transmitter

Among other items from the same source which have been examined, mention may be made of the rotary vacuum pumps of the vane type, which are suitable for use either as extractors or low-pressure blowers, piston type compressors for air supply at moderate or high pressure, and rotary hydraulic pumps of the gear-wheel type, either single or double stage, suitable for pumping liquids at either high or low pressure, and for running at various speeds according to the output volume required.

The "Ammo Assisters" offered by Messrs. Aero Spares contain a very powerful intermittent-rated motor working on 24 volts, together with an efficient enclosed worm gear of 16-1 reduction and a spur gear of 2-1, giving a total reduction of 32.1.

The Ship Models

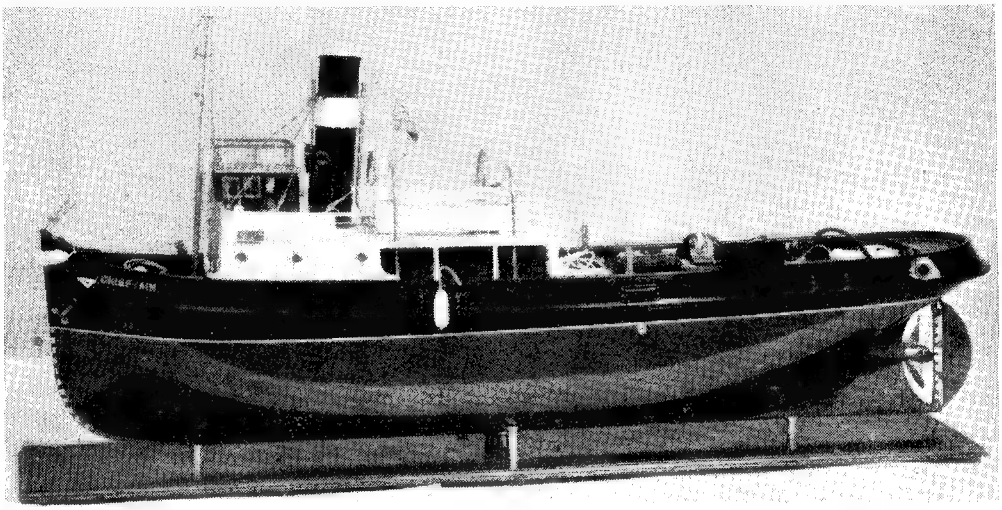
at the "M.E." Exhibition

OUR surmise based on the entry forms that there was no one ship model which was considerably ahead of the rest has been confirmed by ■ careful scrutiny of the models in the Exhibition. But what is really encouraging is the fact that the general standard of the ship models showed ■ considerable all-round improvement over that of previous years. Whether this is due to the work of the ship model clubs, or to the numerous exhibitions which have been held in all parts of the country, or to the greater information which is becoming available, it is difficult to say. Probably, in some measure to all three. In any case, there is every sign that the love of fine craftsmanship for its own sake is as great as ever it was, and that the skill of the craftsman is by no means being lost in this age of mass production. The improvement is not confined to any one class of ship model. Working models, and exhibition models of both power and sail driven ships share in it, as also do the miniatures.

The number of ship models this year, showed considerable increase over last year, approximately 20 per cent. more models having been sent in—in fact, the ship model section was the largest of any in the Exhibition.

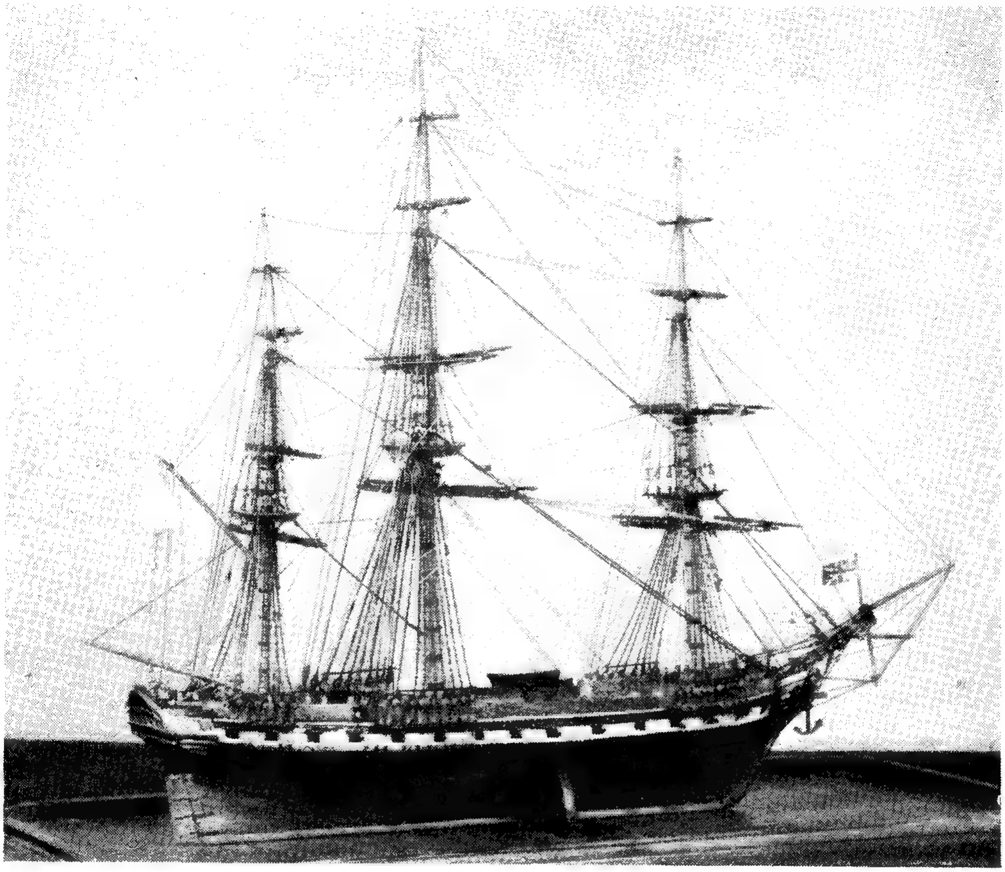
The same is seen in other sections of the exhibits, with the result that the display of the competition models has been extremely difficult. Some of the visitors complained that the competition models were being crowded out by the trade stands, but we can assure them that this is not the case. The space allocated for the display of competition models was as great as ever it was, but owing to circumstances quite beyond our control we cannot procure a larger or more suitable hall and have had to put up with a certain amount of congestion.

Coming now to the models, the Championship Cup for the sailing ships was won this year by Mr. Field's model of an early 16th century carrack. This was ■ beautiful rib-and-plank job with the decoration carried out in boxwood. The model as a whole represented years of research and constructional work and was an outstanding example of ship modelling. In the steamship section the Championship Cup was won by Dr. Fletcher, of Colne, with his model of a river and coastal tug boat *Chieftian*. After the judges had come to a decision they were informed, to their surprise, that the same competitor won the Championship Cup in last year's Exhibition. However, if the same competitor wins the cup two years in succession it only goes to show that he is running true to form and that no other competitor has been able to outpace him. This particular model was also built of wood, being planked in the correct shipbuilders fashion. It was powered by ■ well-designed and beautifully-finished compound steam engine, and the deck fittings, and, in fact, the whole ship constituted ■ superlative example of ship modelling.



The Championship Cup winner in the Power-driven Ship Models, a fine tug by Dr. Fletcher, of Colne, who also won the cup last year

In the miniatures, Donald McNarry was again the outstanding personality, his *Cutty Sark* and his *Golden Hind* being, without question, the finest miniatures we have seen in his scale of 1 in. to 50 ft. The invariable comment on the rigging of his *Cutty Sark* was " How can he possibly do it ? " The model as a whole gave the



Captain Shenton's model of a 32-gun Frigate, a notable example of ship modelling by the oldest competitor at the exhibition

impression of having been made to a larger scale and, by some mysterious means, reduced to incredible dimensions. Another notable miniature was the model of the *Charles Galley*, 1676, by Captain Wall, of Elham, who will be remembered for his $\frac{1}{2}$ in. to 1 ft. model of H.M.S. *Portland* which was described in THE MODEL ENGINEER in 1946. His latest model was to the scale of $\frac{1}{16}$ in. to 1 ft. and was built with the ribs exposed in true Navy Board style. The deck construction was fully detailed and the timbering generally was shown completely. An interesting miniature was that by R. Carpenter, D.S.C., of Brighton, which showed a cargo ship moored at bouys loading crated cars from a barge. The action and the general atmosphere were very well indicated.

In the sailing ships the model of a topsail schooner by C. J. Clark, of West Bromwich, was a close runner-up for the cup which it missed by only a very few marks. The craftsmanship and finish of this model was of a very high order. These smaller ships make very interesting prototypes, as the scale being fairly large, most of the detail can be shown. Another interesting model was that of the barquentine *Waterwitch* by S. W. Shipsides, of the Bristol club. In addition to his exquisite ship modelling, Mr. Shipsides is noted for his realistic seas. In this case the brown water was suggestive of the Bristol Channel with which, no doubt, he is well acquainted. Another notable model was that of a 32-gun frigate by Captain Shenton, R.N. retd., the oldest competitor in the Exhibition. Captain Shenton, who is 88 years of age, spent the opening day at the exhibition and left at 4 p.m. thrilled by what he had seen. His model was made when he was quite an old man and is a very fine piece of work apart altogether from considerations of age. The rigging is particularly well done. This is probably due to the fact that he knows the rigging intimately having served in the Royal Navy in the days of masts and yards. Mr. Collins, of Gt. Bookham, sent in a very fine model of a 50-gun ship of 1736. This was a careful copy of the model in the Science Museum and the entire work was carried out to a very high standard. We would have preferred to have seen some of his guns in brass (oxydised) instead of in white bone, but there was very little to criticise in the model as a whole. The model

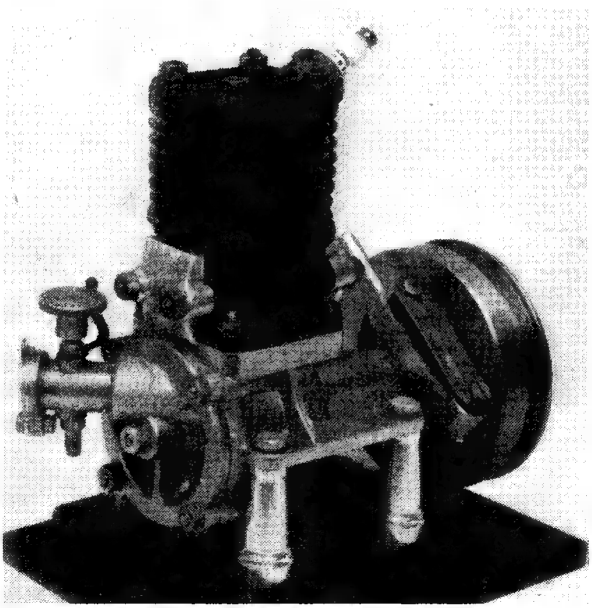
of the yacht *Colean* by C. S. Sandeman, of Balmore, Stirling, was a very dainty piece of work. His subject was, however, so slight that the model was probably missed by many visitors to the Exhibition. The model of the *Endeavour Bark*, 1768, by J. N. Hampton, of the Surbiton club, was notable for its nicely-proportioned rigging. The general finish of the spars and indeed of the model as a whole was highly commendable. The ketch *Martinet* by M. Maltby, of Sheffield, showing the vessel in a bleak, cold sea was a beautiful example of scenic modelling.

Among the steamers were some beautiful waterline models, notably that of S.S. *Beaconstreet* by D. S. Anthes, of Sheffield. This model was based on personal knowledge of the ship, Mr. Anthes having served as chief officer aboard her, and the amount of detail in the model at so small a scale was remarkable. The ship was shown in her wartime colours of uniform grey and as a consequence did not look so eyeable as a ship painted in normal fashion. However, in spite of this, the model was a true representation of the actual ship. Mr. Taylor's model of T.S.S. *City of London* was up to his usual standard and an immense amount of careful detail work was incorporated in it. We thought his model of M.V. *San Demetrio* was not quite up to the same level, but the two form a very notable exhibit coming from one man. An interesting model was that of the Mumbles lifeboat by H. G. Swarts. Mr. Swarts is coxswain of the Barry lifeboat and thus should be familiar with the details, and evidently he has the skill and craftsmanship to put into model form the knowledge he possesses. The photograph on page 284, September 1st issue, gives some idea of the work embodied in his model. A. C. Yeats, of Nottingham, sent in two notable models, one of M.V. *Scottish Borderer* and the other of R.M.S. *Hibernia*, an Irish cross-channel packet. These were notable for the beautiful lines of their hulls and the lovely finish of the paintwork. In the power-driven steamship models a notable exhibit was that of the cabin cruiser *Barbara* made by O. P. Corderoy, of Isleworth. It seems difficult to believe that this was a first attempt at ship modelling on the part of Mr. Corderoy, but we are assured that it was built as the result of seeing the cabin cruisers in last year's Exhibition. However, the power-driven models have already been described, so that there is no need to enlarge on them here.

(To be continued)

*I.C. Engines at the "M.E." Exhibition

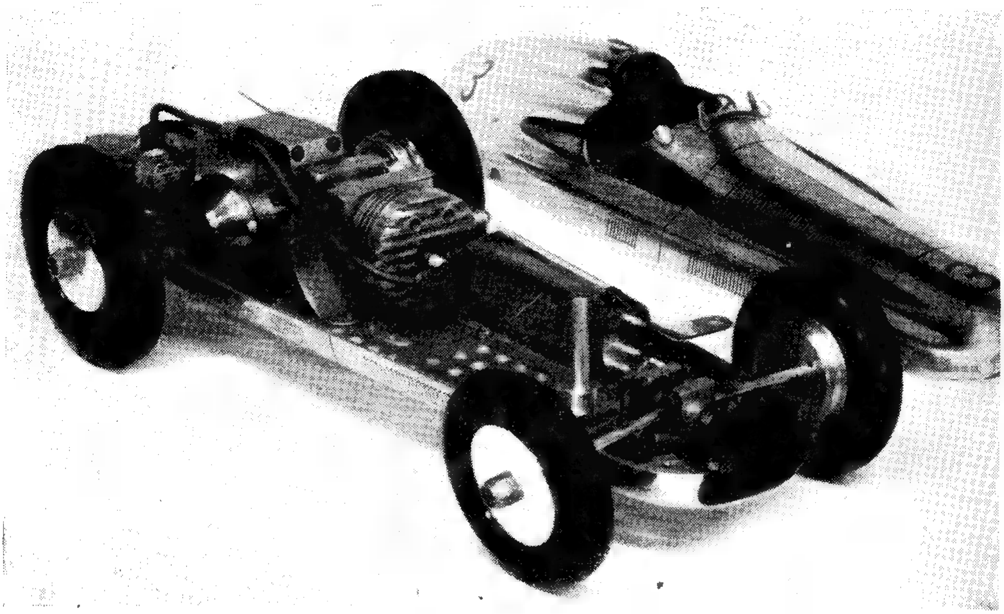
SEVERAL of the power boats entered in THE MODEL ENGINEER Exhibition were fitted with i.c. engines, but few of them presented any interesting or original features in the power plant. The great majority of the i.c. engines were of the 2-stroke type, both petrol and compression-ignition engines being represented. One notable example of a 4-stroke engine applied to a power boat was in the "M" Class destroyer by W. Croft, of Mitcham, and although the type of engine used might hardly be regarded as appropriate for a boat of this class, it must be put on record that the arrangement of the power plant was very ingenious and workmanlike, and, moreover, has been found entirely satisfactory in practice. The engine was a 15 c.c. "Kittiwake," driving twin screws through an enclosed oil bath gearbox of fabricated construction. An ingenious form of starting gear was fitted to the engine, and minor modifications included a vertical float feed carburettor, which gives a wide range of speed control.



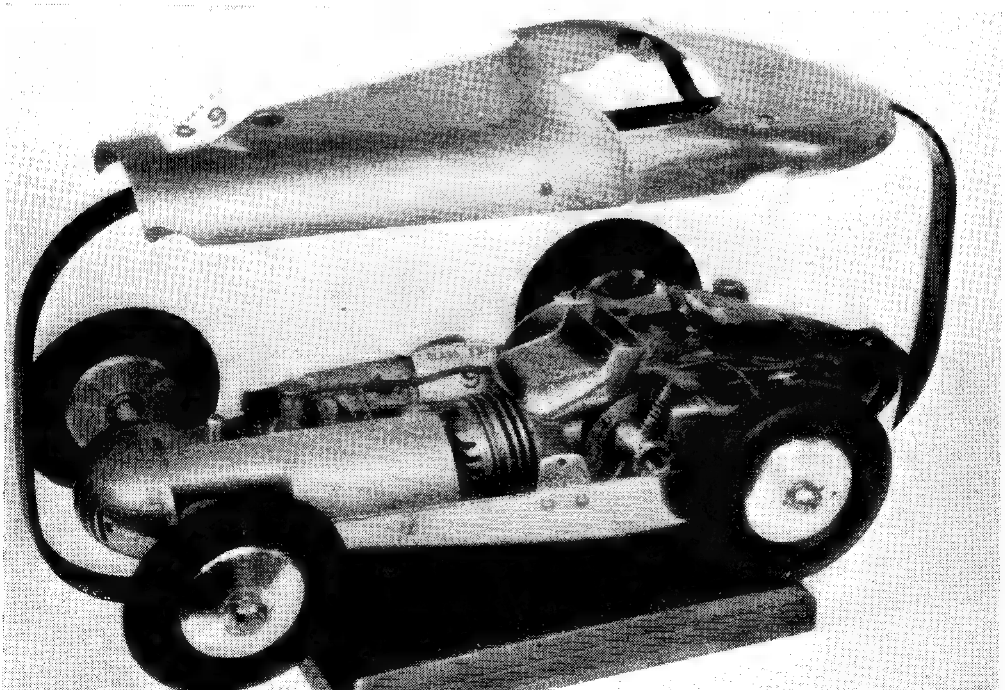
The "Ensign engine" by Mrs. D. H. Duncan

No examples of internal combustion engines in rail locomotives were seen in this year's Exhibition, but in the mechanically-propelled road vehicles class was one example of the still popular "M.E." "Aveling" type diesel road roller, by G. H. Walter, of London, W.3. This was a very well made model, but presented no outstanding features, and appears to be built throughout to the standard design.

**Continued from page* 315, "*M.E.,*" *September 8th,* 1949.



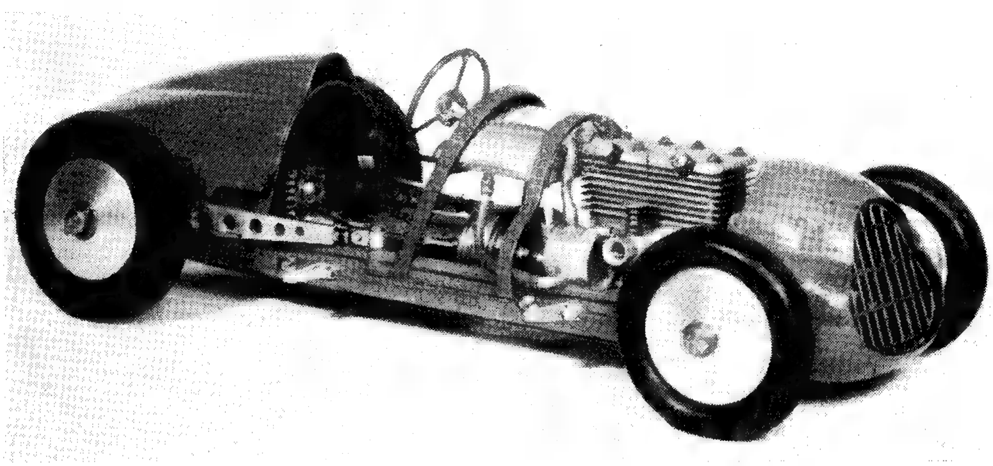
The 10 c.c. model racing car by H. S. Howlett



The " Vampire " 10 c.c. model racing car by P. Parker

It was gratifying to note that in spite of the increasing predominance of the commercial engine in model racing cars, interest in the home-produced engine has not diminished, and the general standard of design and workmanship of such engines in this year's Exhibition showed a distinct improvement over those of previous years.

Three examples of 10 c.c. horizontal spur geared engines appear in this class, the first being by H. S. Howlett, of Newcastle, in which the engine appears to follow fairly orthodox tendencies in its design, and apart from remarking that the engine construction and the layout of the plant generally appears to be workmanlike, little more can be said of this particular example.



The model E.R.A. car, with 10 c.c. twin two-stroke engine, by F. J. Harvey

Originality

The engine fitted to the "Vampire" car built by P. Parker, of London, N.17, bears rather more distinctive traces of original design, though the general layout of the engine and its gearing is much the same; but the engine fitted to the "Alfa-Romeo" racing car by C. W. Field is distinctly original, both in its design and arrangement. In contrast to the almost universal 2-stroke, this is an o.h.v. 4-stroke engine of 5 c.c., with inclined valves, and the engine is mounted obliquely in the chassis, driving through spur gearing to the back axle. Unfortunately, from the point of view of illustrating the model, the engine is rather awkwardly placed, and it was found impossible to get a good view of it without completely stripping the chassis, but it was of outstanding interest, not only from the aspect of novelty, but also for fine workmanship and finish.

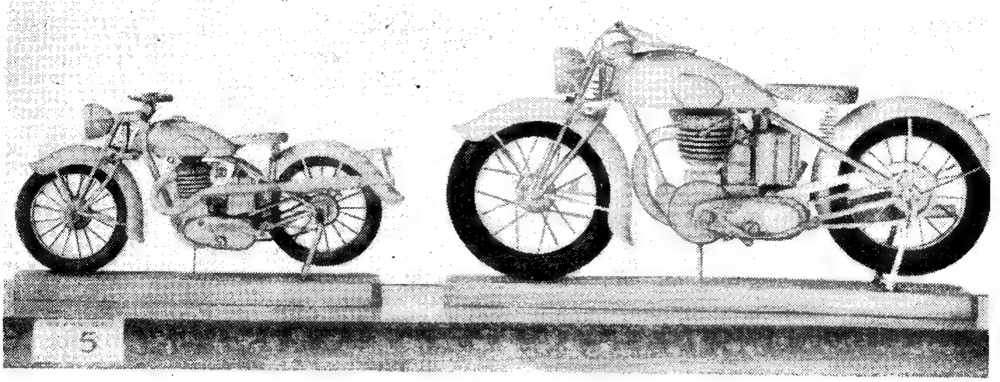
The latter features were also evident in the "B" type E.R.A. racing car by A. F. Weaver, of London, N.W.4, the 5 c.c. engine of which was originally constructed from commercial castings, but has been very considerably improved and modified.

Close to Realism

Unorthodox from the point of view of model car construction, yet approaching more closely to realism when compared with full-sized practice, was the engine of the "E" type 1½-litre car by F. J. Harvey, of Enfield. The engine of this car was a twin-cylinder vertical 2-stroke, the arrangement and location of which in the car chassis was similar to that of the full-sized car. No data exists regarding the performance of the engine, but it certainly deserves to be successful, and it is hoped that further information will be available on this point. The engine drives through a centrifugal clutch to a spur gearbox, and thence to bevel gearing, from which the drive is transmitted by universally jointed shafts to the rear wheels.

Ambitious

A twin-cylinder vertical 2-stroke featured also in the unfinished car chassis by E. H. Lock, of Hucknall, and in this case the design is still more ambitious, the engine being fitted with a supercharger, presumably of the eccentric vane type, though no details are available of this or of other features in the internal construction. There is some doubt as to whether the construction of this model has yet proceeded to the stage of running the power plant, and therefore one can only conjecture what its success is likely to be; but if external appearance can be depended upon, it would seem that the supercharger is very much on the large side for the engine, and might possibly absorb far more than its fair share of power. The engine is intended to drive all four wheels through transmission shafts at either end, leading to bevel gearboxes in the centre of the chassis. In this case again, univer-



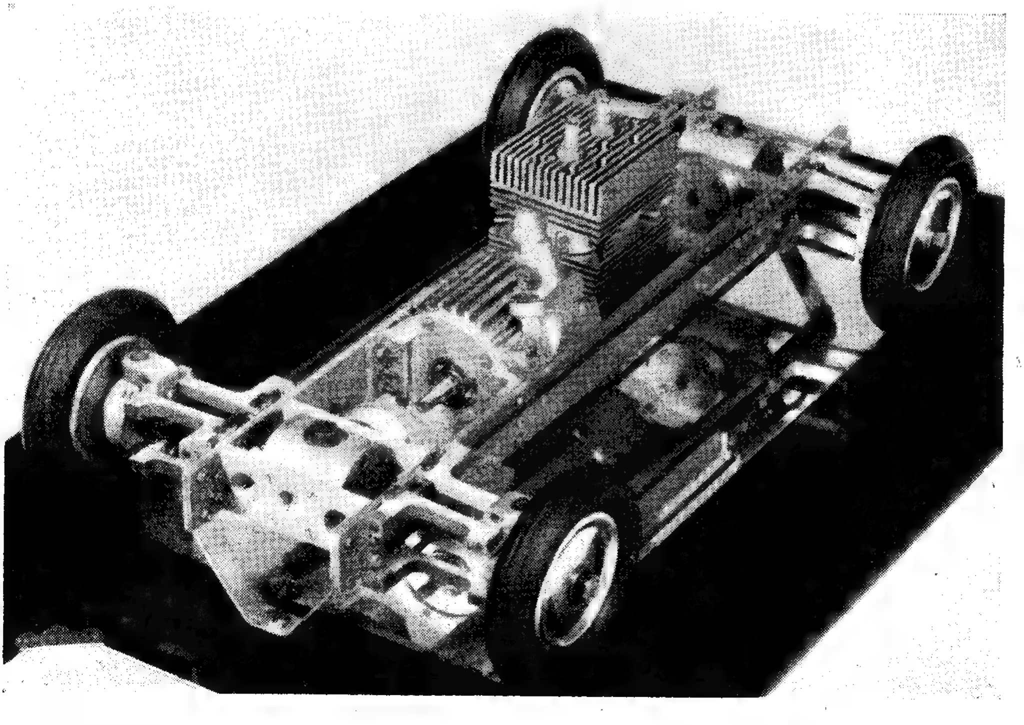
Two motorcycles in wood, by J. Mocogni

sally jointed shafts are used to transmit power to the track wheels, the axles of which are articulated, and sprung by means of torsion rods.

Although obviously not working models, the engines fitted to the two model motor cycles in the Competition Section may deserve a passing reference. These were made by J. Mocogni, of Sunderland; one of them is an o.h.v. 4-stroke and the other a 2-stroke, and although the particular medium employed is not, by any means, a convenient one for the representation of an engine in such a small size, they were sufficiently well detailed to be readily recognised for what they were intended to be.

Another motor-cycle model, the "Corgi," by A. Stannard, of London, E.17, was also fitted with a dummy 2-stroke engine.

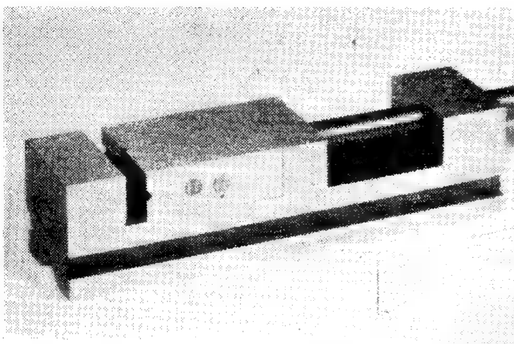
(To be continued)

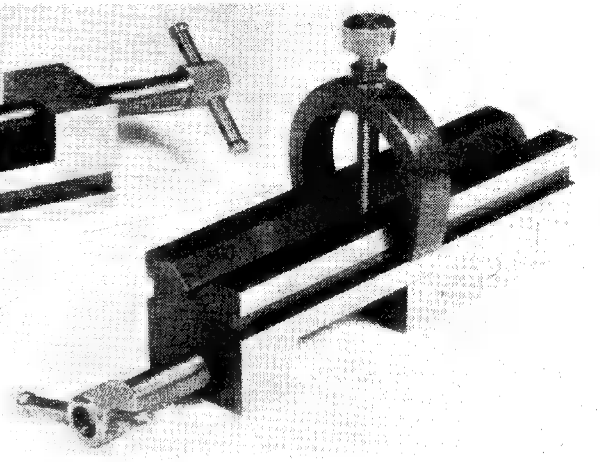


Unfinished car chassis with twin-cylinder supercharged engine, by E. H. Lock

*" Duplex " Visits the Exhibition

THE hand tools on the tool merchants' stands in the exhibition suggest that the standard of finish is improving; this is noticeable in the range of small pliers exhibited by Messrs. Buck & Ryan. Of recent years, it has been difficult to buy small pliers, and such pliers as were obtainable were clearly designed for heavy and rough duty. Now, however, it is again possible to buy small pairs of pliers which show evidence of [redacted] good standard of design and finish.





Above : *Fig.* 7. *The Eclipse Vee-Vice*

Right : *Fig.* 8. *The Vee-Vice inverted, as a V-block and clamp*

Messrs. James Neill & Co. Ltd. whose Eclipse saws and small tools are well known, have added some interesting new tools to their range. The first of these is the Eclipse No. 235 Composite Vee-Vice. The makers describe that as two tools in one, for it is in essence [redacted] tool-maker's vice which, when inverted, may be used as a long V-block with the clamp provided. The vice has two sliding jaws of different lengths which enable it to accommodate varying sizes of material. In order that holes may be drilled through work held in the vice, two parallels are provided for inserting between the work and the bed of the vice. By this means, the work is held clear of the bed and there is thus no danger of the vice being damaged. When not in use, these parallels are housed in the larger of the sliding jaws, as may be seen in Fig. 7, which shows the vee-vice in use [redacted] vice proper. In Fig. 8 the tool is shown inverted and it is then used as [redacted] V-block with its clamp.

The Eclipse range of pin chucks has been extended by the addition of the long-handled form shown in Fig. 9. These tools [redacted] numbered 131 to 133 in the makers' catalogue. The Eclipse No. 160 pin chuck will be found of great interest to those who require some means of holding very small drills accurately. As will be seen from the illustration in Fig. 9, this chuck is designed to be gripped in the chuck of [redacted] high-speed drilling machine by [redacted] shank provided for this purpose. In addition, three alternative collets are supplied having [redacted] holding range from 0 to 3/32 in.

Really small practical universal vices have, in the past, been lacking from tool merchant stocks. This deficiency has been made good by the Eclipse Instrument Vice No. 180, which is fully universal, as it swivels on both [redacted] horizontal and [redacted] vertical axis and is fitted with positive locks for each swivel arm. The vice is secured to the bench by [redacted] clamp screw; the main casting being in the form of a G-clamp, having [redacted] split housing to take the horizontal swivel arm.

Messrs. Moore and Wright were again showing a comprehensive range of fine tools many of which will be familiar to readers, and we were particularly pleased with the new Spring Dotting punch No. 279, which experienced workers will find invaluable for small marking-off work. Whilst this type of punch is not by any means new, we [redacted] glad that it has again become available.

One of the more troublesome jobs that are encountered in the amateur workshop is the bending of small rods and tubes and other forms of material. Many [redacted] otherwise well-finished assembly has been spoiled by unsightly bending, moreover, some types of bend are so difficult to make without proper equipment that they have to be avoided. In this connection, Messrs. W. Kennedy Ltd., of West Drayton, Middlesex, have come to the amateur's help and have put [redacted]

**Continued from page* 317, " *M.E.*," *September 8th*, 1949.

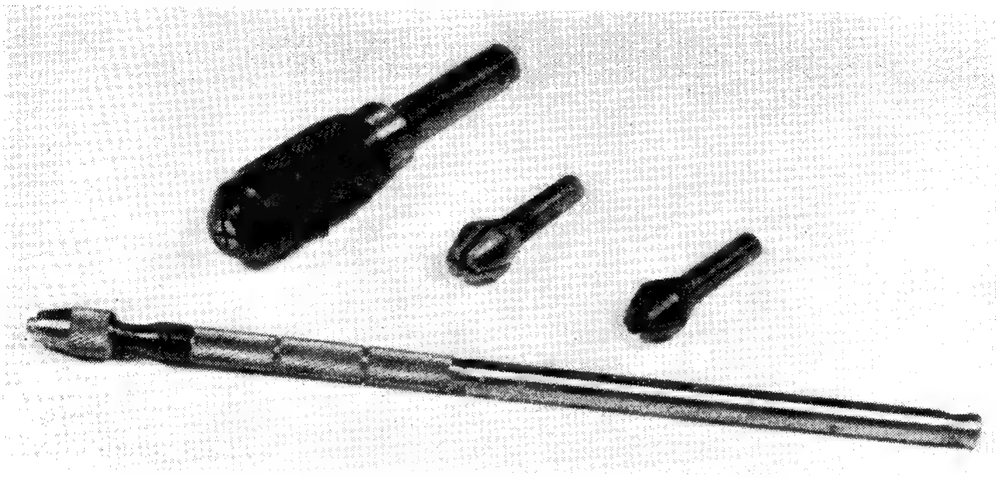


Fig. 9. Eclipse pin chucks

the market their No. 0 Universal bending machine seen in Fig. 10. This has a maximum capacity in non-ferrous tube of $\frac{1}{2}$ in. diameter and in steel tube of $\frac{3}{8}$ in. in diameter. Bending a strip on-edge, which is otherwise an almost impossible job, can be readily carried out, and the maximum capacity in this case is $\frac{5}{8}$ in. by $\frac{1}{8}$ in. for non-ferrous material, and $\frac{1}{2}$ in. by $\frac{1}{8}$ in. for steel. We had an opportunity of seeing this machine demonstrated and were impressed with the quality of the work produced. The machine comprises a Base A, having bolting lugs for attachment to the bench, and there is a further lug carrying a stop J, which resists the bending force. Fitted to the base is a 1 in. diameter steel screwed centre mandrel B, up and down which the top-plate C screws. This plate engages the work, at the same time constraining it and preventing it from distorting.

Bending is accomplished by means of the arm D, operated by the lever E which carries the adjustable bending spindle and roller F. It is this roller which makes actual contact with the work. A releasing plunger G is fitted to the bending arm, and when the plunger is dropped into the nearest hole in the top-plate, it enables the top-plate to be released from the work as the movement of the lever is reversed.

A suitable former H is placed over the screwed centre mandrel. This is a disc having its rim shaped to suit the work, thus for pipes the former is grooved. Strip-on-edge can be bent without a former, as the bottom of the centre mandrel is protected by a hardened steel rim.

Those who like making their own tools will be interested to know that a complete set of castings and materials to make this tool is obtainable from the makers.

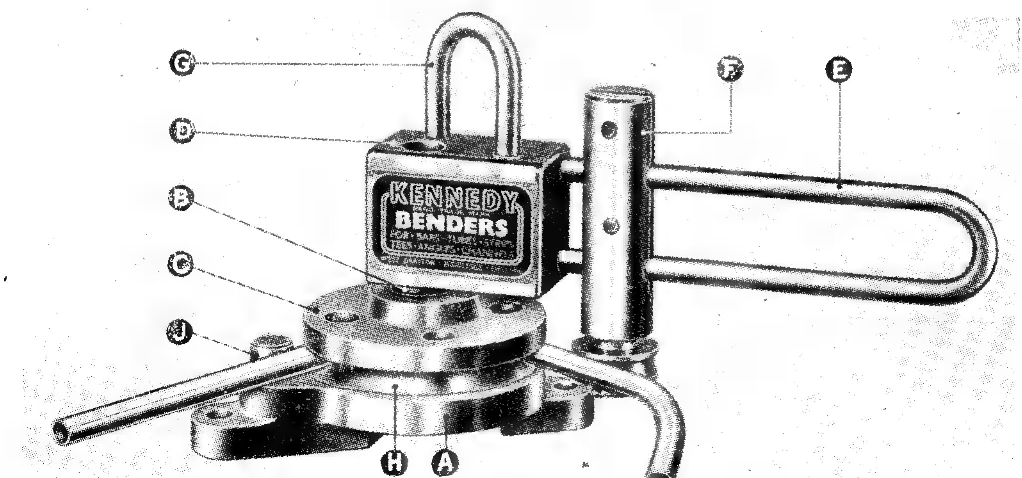


Fig. 10. The Kennedy bending machine

*Traction Engines not so Well Known

by Ronald H. Clark, A.M.I.Mech.E.

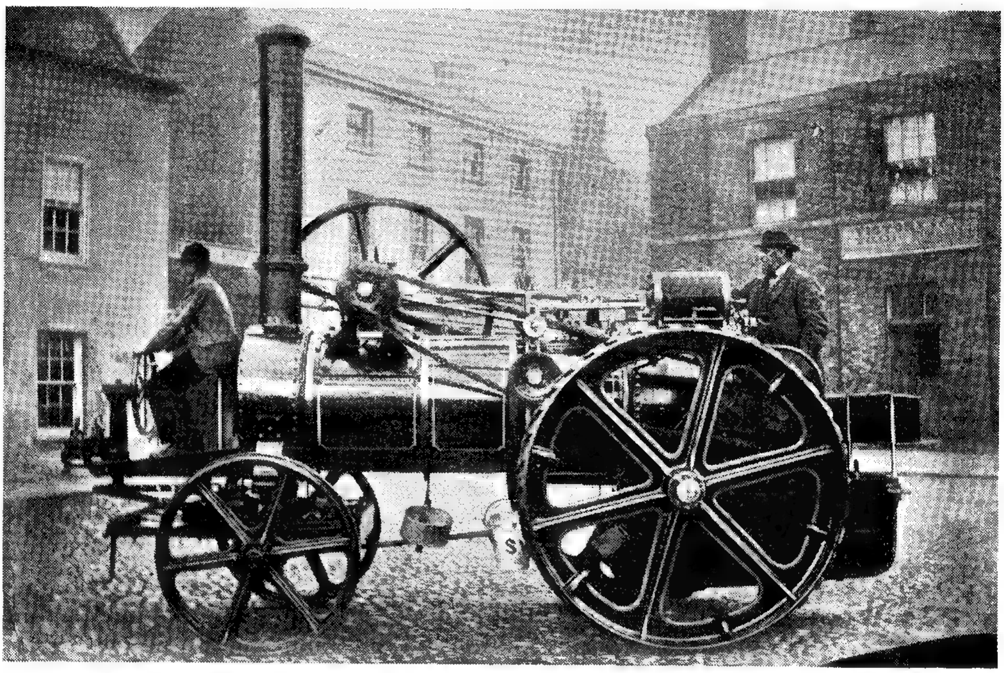


Fig. 36. Frederick Savage's No. 1 traction engine of 1870

XX—Savages Ltd., St. Nicholas Works, Kings Lynn

Founded in 1850 by the late Frederick Savage, who hailed from the Norfolk village of Hevingham, and made his first traction in 1870. This was a very interesting engine and is depicted in Fig. 36. True to period, the cylinder is placed over the firebox with the crankshaft near the chimney in two bearings secured in two cast-iron brackets bolted to the boiler. The drive to the countershaft is by pitch chain, the final drive to the rear wheel being by annular gearing, the ring being on the inside of the wheel rim (compare Fig. 14). In this instance, two speeds are provided for by using two sprockets on the offside end of the crankshaft, a large and a small, the former being arranged to slide along the shaft to take up the same chain line as the low-speed which remains fixed and is accommodated within the high-speed sprocket when the latter is moved into position. The high-speed wheel is then locked on the crankshaft by means of a pin. To enable the change of gear to be carried out, the chain is taken off the low-speed sprocket and then girded around the high-speed wheel after it is pinned in position, the difference in chain tension being accommodated by moving the jockey pulleys in their slotted frame, clearly seen in Fig. 36, to suit. Old drivers who used these engines in their flourishing youth tell me that, unless a good distance of level road was known to be in front, little gear changing was indulged in.

The countershaft carried a differential and extended right across the engine in front of the boiler backhead to make the engine of the three-shaft type and double-geared on the last motion.

Steering was by means of a "ship's wheel" mounted on a pillar with sprocket and chain at the bottom, the steersman having a seat and platform to himself in front of the smokebox. I must mention again the old drivers who have put me wise to some of the troubles that might arise if the driver and steersman were not on good terms, or if the latter heard (purposely?) incorrectly what was their destination! However, in Fig. 36, all is well, as Frederick Savage himself is in control, the photograph being taken in the Tuesday Market Place at Lynn.

Three years later, in 1873, practical use and experience had suggested several important modifications, and engine No. 114 is depicted

*Continued from page 298, "M.E.," Sept. 1, 1949.

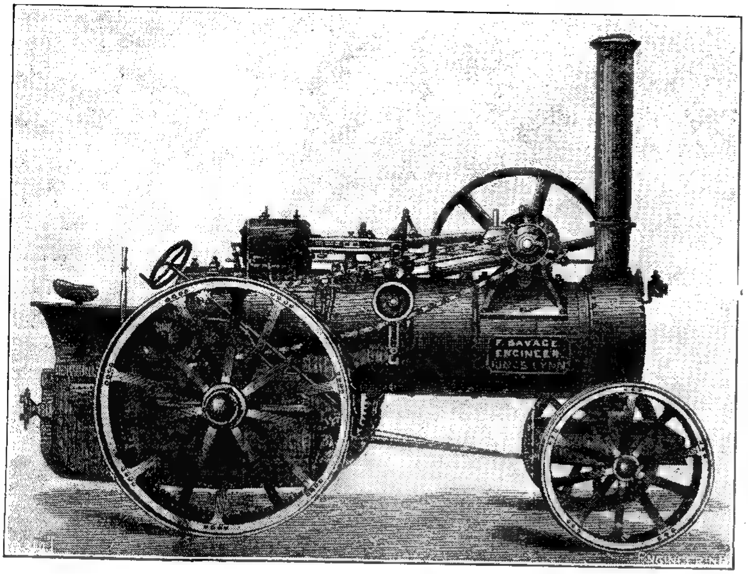


Fig. 37. Second type of chain engine by F. Savage

in Fig. 37, for which illustration I am pleased to be able to use Savage's own contemporary and original block. The front steersman's platform, wheel and column are all dispensed with, and steering is by handwheel, worm and chain barrel which has remained in use ever since. The manstand has been heightened and the tender beneath it appears in the form which has become permanent practice. The rest of the engine, including the drive, remains as before.

Simultaneously, another "model" was produced utilising cast-iron wheels of six spokes each, front ship's-wheel steering and only one speed was arranged for, with the chain on the nearside. Only an odd engine or two of this type was made, the favourite being that seen in Fig. 37.

Frederick Savage had always been interested in steam ploughing and cultivation, and it is, therefore, not to be wondered at that, at about this time, he evolved and marketed his patent ploughing-cum-traction engine called the *Agriculturist*, illustrated in Fig. 38. Here the chain drive is entirely dispensed with, it now being all geared on the three-shaft principle, the cylinder is in the now-accepted place and the whole engine was a very workmanlike job. Note that in the centre of the tread of each rear wheel there is a movable section, and in the hollow therein concealed is coiled several hundred yards of best wire rope, a coil around each rear wheel. They were coiled in opposite directions so that when one was winding, the other was paying out slack. When the engine was reversed by the link-motion, the opposite took place. To operate the cultivator, the engine was jacked up with its hind wheels clear of the ground in the middle of one side of the field, and the two ropes led off via various porters to each end of the cultivator, which was pulled parallel with the line of the engine backwards and forwards across the field. The driver had simply to reverse each time the plough reached the verge of the field, the rope porters being shifted to suit as work progressed. The system proved very practicable, and several complete sets were exported to the Colonies while others were sold in this country.

All types of steam engine were now being made in St. Nicholas Works, and the traction engine side of it was given great attention, the next design in 1884 being included in Fig. 39, which type was known as the "Sandringham" class,

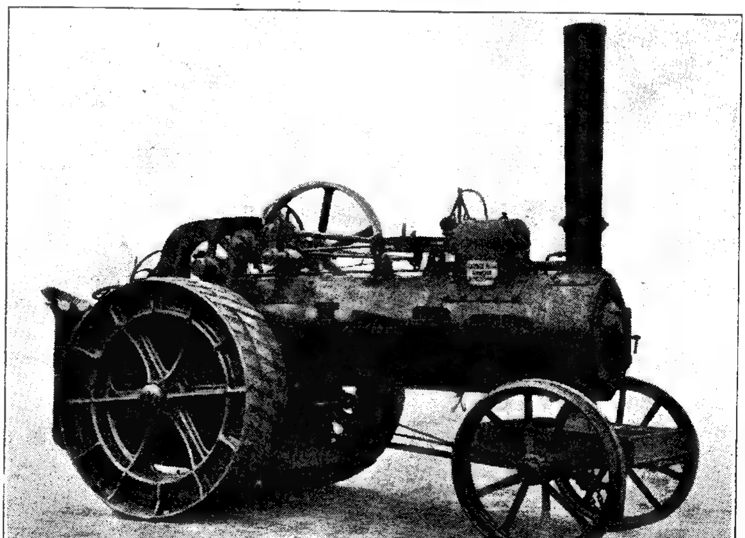


Fig. 38. Ploughing and traction engine by F. Savage

a name suggested by the proximity of the Royal establishment. These engines became very famous in eastern England, and there are numbers about still at work with no sign of ever wearing out. The reserve of boiler power was very great and this, combined with Savage's patent slow-motion gear, which could be brought into operation in a few moments, made it possible to drive an engine out of funny places which would probably prove too much for a dissimilar engine.

Now a word about this slow-motion gear. The engine is of the three-shaft type and with the low-speed pinion near the crankshaft bearing. Suitably placed between the crankshaft and the second motion shaft but a little forward, is a short stub shaft on which is mounted a double pinion set of 15 and 35 teeth respectively, seen ready for placing in position in Fig. 39. The ordinary gears are slid along the crankshaft into neutral when the slow-speed pinion now engages with the larger pinion of the slow-motion gear of 35 teeth. The 15-tooth pinion of the set now

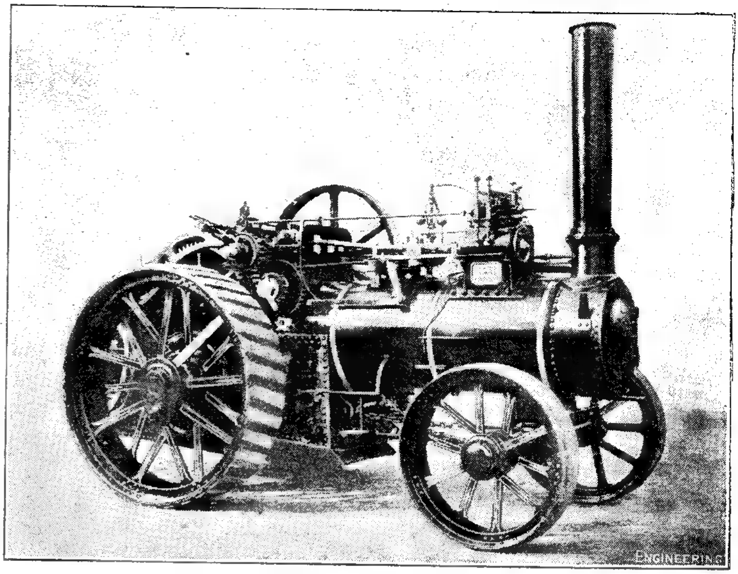


Fig. 39. F. Savage's "Sandringham" class general purpose traction engine

crankshaft gears of 12 and 21 teeth, second speed ring of 65 and 74 teeth and the final drive having 16 and 63 teeth, then the low-speed ratio would be: $\frac{12 \times 16}{74 \times 63}$ = 24.28 to 1, and the high-speed ratio will be $\frac{21 \times 16}{65 \times 63}$ = 12.18 to 1.

TABLE VI—Main Dimensions of SAVAGE Traction Engines

N.H.P.	Cylinder	B.H.P.	R.P.M.	Dia. of crank-shaft	Dia. of Main Axle	Overall Length	Overall Width	Height to top of flywheel	Overall height
6	8″ × 10″	18	160	3⅛″	4¾″	15′-10″	7′-4″	8′-1½″	10′-5″
7	8⅝″ × 12″	21	150	3⅜″	5⅛″	15′-6″	7′-10″	8′-6″	11′-5″
[illegible]	9⅛″ × 12″	24	150	3⅜″	5½″	16′-8″	8′-2″	8′-8″	11′-7″

N.H.P.	Rear wheel Dia.	Rear wheel width	Grate area sq. ft.	H.S.F. Box sq. ft.	H.S. Tubes sq. ft.	H.S. Total	Tubes No.	Tubes Dia.	W.P. p.s.i.	Weight Approx.
6	5′-6″	1′-4″	4.5	27.4	90.6	118.0	23	2½″	120	7¾T
7	5′-9″	1′-6″	5.9	34.7	117.8	152.5	30	2½″	120	8½T
8	6′-2″	1′-6″	5.7	38.8	140.0	178.8	32	2½″	120	9¼T

meshes with the high-speed crankshaft pinion (now free on the crankshaft) but which also meshes with the high-speed gear of the spur-ring on the second motion shaft. The final drive remains unaffected. The nett effect is to introduce an extra ratio into the train of gears, the engine becoming for a time a three-speed engine with an emergency low-speed gear. Assuming a normal "Sandringham" class engine to have

Fitting the slow-motion gear gives an emergency low ratio therefore of $\frac{12 \times 15 \times 21 \times 16}{35 \times 21 \times 65 \times 63}$ = 49.76 to 1.

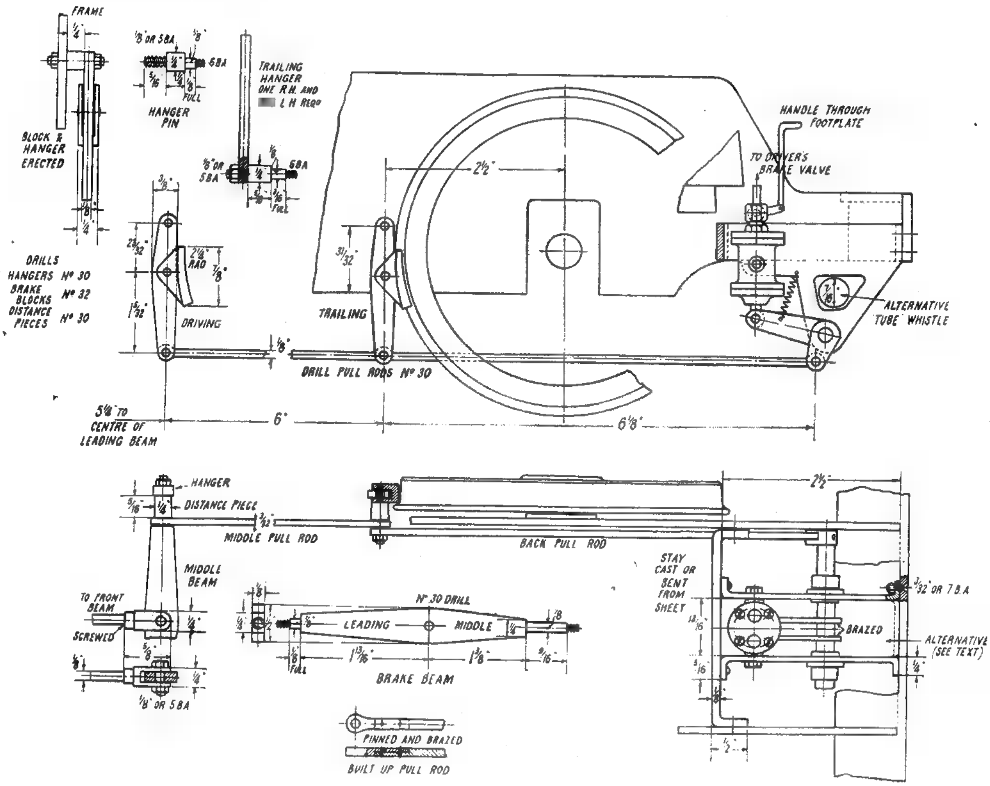
The workmanship and finish of these engines were of a high order, as can be seen from Fig. 39 and the main dimensions are contained in the schedule in Table VI.

(To be continued)

A 3½-in. Gauge L.M.S. Class 5 Loco.

by "L.B.S.C."

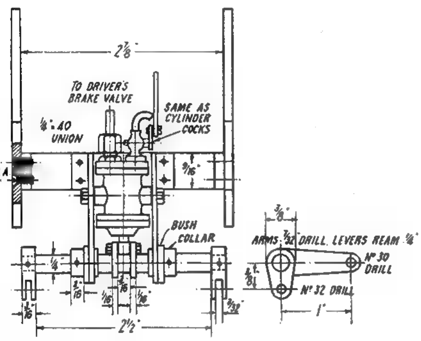
IT seems to me as though I have taken out a season-ticket on brakes, what with the "Maid of Kent," "Minx," and a set I schemed out for a Southern "Schools" class engine! However, this description of a steam brake for these, and they carry the brake shaft and cylinder. If you take a look at the reproduced drawing, you'll see that I have incorporated the same layout on "Doris." The cross stay fixed behind the firebox, may be a casting, or bent up from



Steam brake for "Doris"

the little L.M.S. engine, and the tender hand brake to follow, will finish off another "serial story"; and we shall then be able to have a talk about something else. The brake-gear described below, is a little different from those described for the Southern engines, inasmuch as the full-sized relatives of "Doris" have a steam brake-gear, which operates in conjunction with the vacuum apparatus; and I have endeavoured to make the small edition on pretty much the same lines as in full size. On the big engines, there are (according to the drawing I have) two short longitudinal girders under the trailing end, supported by a cross stay behind the firebox; two hefty brackets are attached to sheet metal, or a plate attached to the frame at each side by pieces of angle. The two side girders are extended downwards to form the brackets carrying the brake cylinder and the cross shaft; the front ends are bolted to the cross stay, and the rear ends to the drag-beam. I have given an alternative way of fixing the rear ends. These girder-brackets may be cut from sheet metal, bushed for the shaft, and have bent-over ends for attaching to drag-beam and stay. It is quite possible that our "approved" advertisers will be able to supply a casting for the whole complete gear frame, but it requires a little more complicated pattern-making than the frame specified for "Maid" and "Minx."

The brake cylinder is a small edition of the 5-in. gauge brake cylinders, but it is placed vertically, as in full size; the connections are made to the top cover. A cock, similar to the drain-cocks on the engine cylinders, is provided to blow out condensate water, and this is operated by a sort of damper-handle projecting through the footplate. The brake rigging is divided at the rear end, same as "Maid" and "Minx," to allow the grate and ashpan to be dropped, for clearing out ashes and clinker after a run; ahead of the firebox, it has the beams and rigging similar to the big engine. Important note: If this brake-gear is fitted, the big whistle previously described, cannot be used, the space



Cylinder and brake shaft erected

being required for the brake frame. In place of it, an ordinary "tube" whistle can be fitted, passing through the holes in the gear frame, as indicated in the drawing.

Brake-gear Frame

If a casting isn't available, the gear frame is very easily built up. The cross stay behind the firebox is simply a piece of $\frac{1}{8}$-in. sheet steel, or strip iron, $\frac{9}{16}$ in. wide, cut to a length of $3\frac{7}{8}$ in. and bent over $\frac{1}{2}$ in. at each end, to fit nicely between the frames. It can also be a piece of similar metal $2\frac{7}{8}$ in. long, with a piece of $\frac{3}{8}$-in. by $\frac{1}{8}$-in. brass angle riveted on at each end; or a pump stay casting could be adapted.

The two longitudinal girders, or side frames, can be cut from $\frac{1}{16}$-in. sheet steel, in exactly the same manner as a pair of locomotive main frames are cut, by temporarily riveting together, and cutting both at once. Note when marking out, that an extra $\frac{1}{4}$ in. has to be allowed at the back end, and an extra $\frac{5}{16}$ in. at the front end, to allow for bending over the parts for attachment to cross stay and drag-beam. It is hardly worth while bushing the holes for the brake cylinder trunnion pins, as the movement is so slight that they wouldn't show any appreciable sign of wear during the whole lifetime of the engine; but the brake shaft has a little more movement, besides which it is a heavy substantial component, and needs a little more support than the thickness of the metal. I have therefore specified bronze bushes. When cutting out the gear frames, drill the holes $\frac{3}{8}$ in.; and after parting the frames and bending the ends, turn up two bushes from $\frac{1}{2}$-in. round rod, and squeeze them into the holes. The bushes should be $\frac{3}{16}$ in. long, with a $\frac{1}{16}$-in. flange, and should be reamed $\frac{1}{4}$ in. after they are pressed in.

The illustrations show how the frames are assembled, and attached to the stay and the drag-beam; but don't erect them until you have made the brake shaft, or—if the long levers are brazed on—you won't be able to get the shaft in place.

Brake shaft

This is similar to those specified for the 5-in. gauge engines, but is made from a $2\frac{7}{8}$-in. length of $\frac{1}{4}$ in. round mild-steel, shouldered down at each end to 7/32 in. diameter, by chucking in three-jaw and operating with a knife tool. The two long levers by which it is actuated, are cut from $\frac{1}{16}$-in. by $\frac{3}{8}$-in. steel strip, to the shape shown. Drill the smaller ends No. 30, but as the levers should be a tight fit on the shaft, so that they "stay put" whilst being brazed, drill them 15/64 in. or letter "C," and then put the "lead" end of a $\frac{1}{4}$-in. parallel reamer in just far enough to make the holes a drive fit for the shaft. Drive them on the shaft so that they are $\frac{3}{16}$ in. apart (3/32 in. each side of centre) and braze or silver-solder them in position. Beginners should put a piece of $\frac{1}{8}$-in. round rod through the holes in the small ends whilst this job is in operation, in case of one trying to shift. After cleaning up, rivet one of the gear-frame plates to the cross stay; put the shaft through the bush, put in the other frame, and rivet that too. The two frames should be $\frac{13}{16}$ in. apart, and nicely in the middle of the cross stay. Turn up two little collars from $\frac{3}{8}$-in. round rod, $\frac{3}{16}$ in. wide, drilled $\frac{1}{4}$ in., and put them on the brake shaft outside the bushes. Pin them to the shaft with bits of $\frac{1}{16}$-in. silver-steel, or 16-gauge spoke wire, driven into No. 52 holes drilled through collars and shaft. Note: the levers must be central between the frames, and the shaft quite free but without end-play.

If a casting is used, with side frames cast integral with the stay, obviously you won't be able to get the shaft in place with the levers brazed on it. In that event, drill the long ends of the levers $\frac{5}{16}$ in. Chuck a piece of $\frac{3}{8}$-in. round steel rod in three-jaw; face the end, and turn down $\frac{1}{16}$ in. of the end to a tight fit in the hole in the lever. Part off at $\frac{5}{16}$ in. from the end; reverse in chuck, and turn down the other end in similar manner. Centre, drill 15/64 in. or letter C, and ream $\frac{1}{4}$ in. Squeeze a lever on each end, line them up with a bit of $\frac{1}{8}$-in. rod through the holes in the small ends, and braze or silver-solder them to the bush. Quench in water only, and clean up. After cleaning up and drilling the cast frame, put the lever in position between the bearings for the shaft, and poke the shaft through the lot, pinning the lever to the middle of it by a piece of 3/32-in. silver-steel or 13-gauge spoke wire, driven through a No. 43 hole drilled through boss of lever, and the shaft.

The drop-arms at the ends of the brake shaft are made and fitted in exactly the same way as those described for "Maid of Kent" and

"Minx," but to the sizes given in the accompanying illustration, so we needn't waste time and space by going into details again. Press them on the ends of the brake shaft, approximately at right angles to the levers, but don't pin them yet.

Brake Cylinder

The brake cylinder is exactly the same type as for the 5-in. gauge engines, but smaller, being only $\frac{3}{8}$-in. bore; the way the casting is machined and fitted, is precisely the same, so beginners can refer back to the issue for July 7th last. All the dimensions are given in the reproduced drawing. It will be noticed that a different type of "big-end" is specified; in place of the fork on the 5-in. gauge size, a circular bush is fitted to the end of the piston-rod. This is merely a $\frac{3}{16}$-in. slice off a $\frac{1}{2}$-in. bronze or gunmetal rod; it is drilled No. 30, and has a 3/32-in. tapped hole in the edge. The end of the piston-rod is turned and screwed to fit. After screwing in, give the joint a dose of silver-solder (an easy job for "Easyflo"!) just to make certain it doesn't come off, as there is so little thread. Put the drill through again afterwards.

As the cylinder is vertical, we can't use the ball drain-valve, so the easiest way to blow out the condensate water, is to put a little cock in the cylinder cover, as shown. This is made exactly the same as the drain-cocks for the engine cylinders, so we needn't go over the ritual again. Screw it into one of the holes in the cylinder cover, and attach a wire to the handle. This wire can project up through the floor of the cab, and be bent over like a damper handle. When right down, the cock should be closed; pulling it up, opens the cock and lets the condensate water blow away through a bit of pipe bent into a swan-neck, and silver-soldered into the nose of the cock. Take the plug out whilst doing this job. A bit of very small pipe will do; 3/32 in. is plenty. The end of the pipe is left open, and set to blow the water anywhere between the rails.

In the other hole in the cylinder cover, fit a $\frac{1}{4}$-in. by 40 union screw (or smaller, if you like) to take a union nut and cone, for connecting the cylinder to the driver's brake valve. All being well, I will describe and illustrate this gadget next week; it is slightly different from the valves specified for the 5-in. gauge engines.

The cylinder is placed between the frames, with the lugs opposite the No. 30 holes, and secured by a couple of little trunnion pins, turned from $\frac{3}{16}$-in. hexagon steel rod, to the dimensions shown. You can use round rod if you like, and slot the heads for a screwdriver; Inspector Meticulous won't bother to poke his nose under the trailing end. Even if he did, it is a simple matter to open the drain-cock and turn steam on! That reminds me of a certain driver who became a "bit too big for his boots and hat" when promoted to inspector. It was a funny coincidence, but whenever he passed close to any engine in the yard or sheds, he always seemed to choose the exact instant that the driver or fireman was trying to start the injector, the overflow pipe of which came out under the step!

How to Erect the Assembly

At $2\frac{5}{16}$ in. from the back end of the frame—that is, just clear of the trailing-wheel flanges, drill a couple of No. 34 holes, and countersink them. The lower one should be 5/32 in. above the bottom of the frame, and the next $\frac{1}{4}$ in. above it. The whole bag of tricks can then be placed in the position shown in the illustrations, and the stay secured to the main frames by two 6-B.A. countersunk screws at each side, running through the holes just mentioned, into tapped holes in the flanges of the cross stay. Cast frames will have similar flanges cast on, and the fixing is precisely the same. The turned-over bits at the rear end of the gear frame, will be found to fit in nicely between the angle supporting the draw-bar, and the two pieces of angle attaching the main frames to the beam. Drill No. 41 holes through the lot, as shown in the plan view, and secure by 3/32-in. or 7-B.A. screws and nuts. Use spring washers under the nuts if available: our advertisers can supply. If any pipes already fitted, come foul of the brake-gear frame, it is a simple matter to rearrange them to clear it.

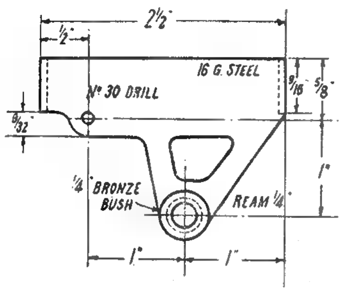
An alternative way of fixing the rear end, may appeal to some of the good folk who are building "Doris." Instead of turning the ends of the gear frame outwards for $\frac{1}{4}$ in., turn them inwards, making them $\frac{3}{8}$ in. full length, so that they meet in the middle. When erecting, take off the angle supporting the draw-bar; put a drill through the screwholes in the drag-beam, and drill holes in the gear frame flanges to correspond. File off any burrs, replace the piece of angle inside the gear frame, and secure the whole lot with longer screws, thus clamping the gear frame flanges between the drag-beam and the draw-bar angle. File the gear frame angle to coincide with the drawbar slot in the beam, replace the drawbar, and there's another good job done. The back part of a cast frame can be attached to the drag-beam in exactly the same manner.

Brake Rigging

As the pull-rods, beams, blocks and hangers are made and erected as described for the "Minx," there is little to add to the instructions already given. The only difference is in the size of the parts. The hangers are filed up from $\frac{1}{8}$-in. by $\frac{3}{8}$-in. flat steel rod, to the dimensions given; note that the trailing hangers have a permanently fixed pin at the bottom, to carry the ends of the back and middle pull-rods, as there is no cross-beam at this point. The holes in the main frame for the pins supporting the hangers, are drilled $2\frac{1}{2}$ in. ahead of the centre-line of each axle, and 31/32 in. from bottom of frame. This is the "scale" dimension, according to the outline drawing which I have, of the full-sized engine; but if you make it 1 in., it doesn't matter a Continental, as long as they are all the same. The pins themselves are turned from $\frac{1}{4}$-in. round steel rod, as shown in the drawing. The brake blocks, if castings are not available, may be cut from $\frac{1}{4}$-in. by $\frac{3}{8}$-in. bar, to the dimensions given.

The leading and middle brake beams, which are of the same flat double-taper pattern as used on the full-sized engines, are filed or milled

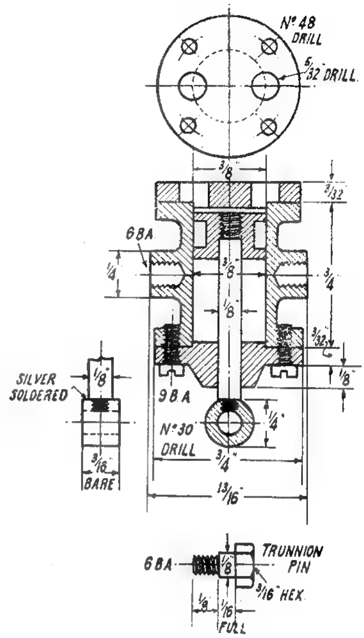
from $\frac{1}{2}$-in. by $\frac{1}{8}$-in. steel bar. The ends should first be turned, holding the bit of bar truly in the four-jaw chuck. Two pieces, each $4\frac{1}{4}$ in. long, will be required. Beginners especially, note that the ends of the leading beam only need $\frac{1}{8}$ in. of " plain " at each end, [redacted] they only have to fit into the lower ends of the leading hangers; but the beam ahead of the driving wheels has to be reduced each end for a distance of $\frac{9}{16}$ in. beyond the screwed part, so that the middle



Brake-gear frame

pair of pull-rods will be parallel to the centre-line of the engine. A distance-piece, $\frac{5}{16}$ in. long, $\frac{1}{4}$ in. diameter, and drilled No. 30, is placed between the eye of the pull-rod and the bottom of the hanger.

The leading and middle beams are connected at their centres by a pull-rod consisting of a piece of $\frac{1}{8}$-in. silver-steel, screwed at each end and furnished with forks, or clevises, as our trans-atlantic cousins call them. They are made in the same way as the valve-gear forks, so there is no need for repetition. When the pull-rod is assembled, the distance between the pinholes in the forks should be $5\frac{1}{4}$ in., and they are connected to the holes in the middle of the brake beams either by $\frac{1}{8}$-in. bolts, or by $\frac{1}{8}$-in. commercial split pins, just [redacted] you prefer. The erection of the whole bag of tricks is exactly as described for the " Minx," and is shown in the accompanying illustrations. I forgot to mention that the piston-rod bush is connected to the operating lever, by a bolt made from $\frac{1}{8}$-in. silver-steel, shouldered down to 3/32 in. at each end, screwed, and furnished with nuts. When the nuts are screwed up tight, the bolts should turn easily with finger pressure, otherwise the levers will nip the bush, and the brakes will jam either on or off. The release is obtained by drilling $\frac{1}{16}$-in. holes in one of the levers, and one side of the gear frame, and connecting them by a close-



Section of brake cylinder

coiled spring wound up from 24-gauge tinned steel wire. Adjust rods until all the blocks touch the wheel-treads at one and the same time, then pin the drop-arms to the brake shaft, and you're all set. All we then need, is the driver's valve which will be described, all being well, in the next instalment.

An Old Pumping Engine

MR. CHARLES LLOYD of Liverpool writes :—" It would appear that Mr. C. Lewis, whose letter on the above subject appears in THE MODEL ENGINEER of August 4th, 1949, has stumbled across an example of Davey's Differential Compound Mine Pumping Engine.

In the Science Museum's Handbook on Pumping Machinery, Part I, there is [redacted] photograph of [redacted] model of one of these engines, together with some notes. The prototype of the model in question had cylinders 34 in. and 64 in. bores by 7.2 ft. mean stroke.

Furthermore, I recently saw in the 1926 edition of *The Steam Engine and Other Heat Engines* (Ewing) an excellent diagram of the cataract valve and governing gear (which is the central feature of the Davey pumping engines), together with a description of its method of operation.

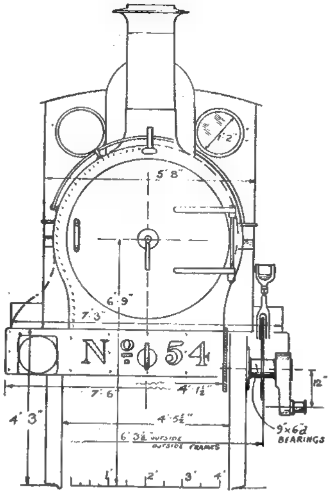
Since Mr. Lewis may not be able to refer to the publications I have mentioned, I shall be happy to make available to him the details of the information I have if he cares to get in touch with me, c/o, The Editor."

Locomotives Worth Modelling

by F. C. Hambleton

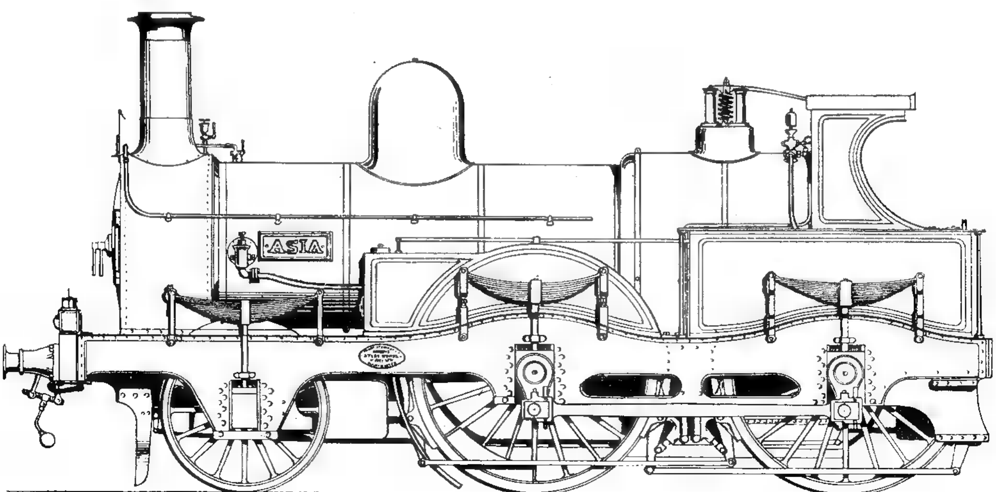
No. 30—London Chatham and Dover Railway—*Asia*

FASHIONS in locomotives! How marked they are; how marked they have always been! Years ago the 2-4-0 tender engine was a favourite type, alike for express and mixed-traffic working. How many of these nice old things, with their double frames and whirling outside-cranks, puffed their way along the familiar main lines of the countryside! This was a type that persisted, too, in spite of other fashions, and as the years went on they became more and more modernised as regards details. How quaint and interesting the earlier examples! How handsome—nay, noble—the later designs! One line in particular seemed to favour such engines: the London, Chatham & Dover Railway. Now the old L.C.D.R. was a very fascinating concern (especially if you loved all railway matters, and were not particularly worried as to how long you might be in arriving at your destination). The carriages were primative, and not very clean, the timetables, running and connections shocking, the signalling up-to-date and very efficient, the scenery charming, and the locomotives altogether delightful! William Martley, who was in charge, until his death in 1874, had been a Daniel Gooch broad-gauge Great Western man, and his engines bore many traces of Swindon influence. Very few of his engines were alike, they bore names but no numbers (the heavy brass name-plates were remarkably like Gooch's, regulator valves were often in the smokebox, and actuated by horizontal pull-out levers, the raised fireboxes were ornamented with a polished brass rim, and they bore two whistles that might have come off *Lord of the Isles* herself! The chimneys had copper caps, and they too, varied a good deal in outline. The painting was green with chocolate framing and—but one could go on in this strain for some considerable time!



The front end of "Asia," showing the outline of the original smokebox wing plate (left), and the numerals added by William Kirtley.

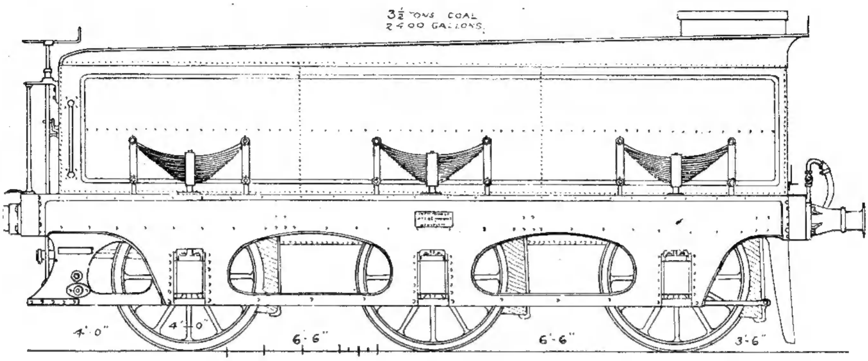
The last four express engines that Martley designed just before his death were built by



"Asia" was built by Sharp, Stewart (No. 2332) in 1873 and ran in this condition for nearly twenty years

Sharp, Stewart & Co., Manchester, and quickly became famous, one might say, throughout the length and breadth of the country. Why was this, you might ask. Well, they were powerful for their day, good looking, with much polished brass and copper work about them, and they were set to work the Victoria-Dover boat trains, which naturally brought them into prominence. For, after all, there is a certain importance about a "Continental," which singles it out from its brother expresses, and oft-times the traveller feels impelled to look at the iron-horse that is destined to start his journey to foreign lands. The traveller that walked along the platform to inspect one of the quartet (*Europa*, *Asia*, *Africa* or *America*) certainly saw an attractive engine.

Try to imagine, that we, too, are sharing the inspection of *Asia* with our imaginary voyager. A big brass dome and high valve cover gleam in the sun. A shapely copper cap (not unlike a Gooch, or perhaps a William Dean—or even a Stroudley) crowns the chimney. The green paint is well set off by its thick black banding, which itself is lined inside with a fine yellow line, and outside with a red one. The handrail goes over the *top* of the smokebox (a Sharp-Stewart touch, this) and at the base of the chimney we see the polished lubricator for the regulator, and behind it the blower cock (shades of Swindon again!). We note that only the driving spring-hangers are adjustable, that there is a maker's plate both on engine and tender, and that reversing is done by a Ramsbottom-type wheel and screw. She is one of the first engines to be fitted with this new-fangled Westinghouse brake (those two little vertical links push down, and so force on the iron brake-blocks). At the front end is the customary white headboard (its reverse side is painted white with two horizontal black bands) and over each buffer is a red-painted square headlamp. These engines have only three lamp-irons in front. Look at the screw-coupling! That must have had a sharp knock at some time (*Asia* bore this crumpled horn for some years!). Is this how she looked when new? Oh, no! The present William Kirtley has introduced a few changes; a new cab, injectors tucked away out of sight, splashers filled in with plain sheet, and a big number fifty-four is now painted in gold on the buffer-beam. Her front wing plate has gone. Well, she certainly is a lovely engine with her elegant chocolate framing and cranks, pleasant coupling-rods and bright brass tube plate cover. Notice the little nuts on the top of the safety-valve, and the bright bowl lubricator tucked away behind the leading spring.



This old-world tender had a steeply inclined curved coping and the maker's name plate in the centre

When William Kirtley succeeded Martley at Longhedge Works, in 1874, he found himself in charge of some hundred locomotives of many varying types. One of the first tasks was the rebuilding of the older engines, as and when funds permitted. Kirtley designed a boiler which in some ways approached a standard, and he also gradually abandoned the green colour for that of black. In due course the "Asias" received the new type of boiler, and were then painted in black livery. This well-known phase of their existence deserves a drawing all to itself—but of this, more anon.

So thus our four friends ran up until 1892—green and shiny and surrounded by more and more new black engines—when they were rebuilt in the latest fashion of the day. Did they look finer when they emerged once more from Longhedge works to enter upon yet another long lease of life? Who may decide on matters of taste? Green or black? Take your choice, good locomodeller, but only after you have seen them in their later rebuilt condition.

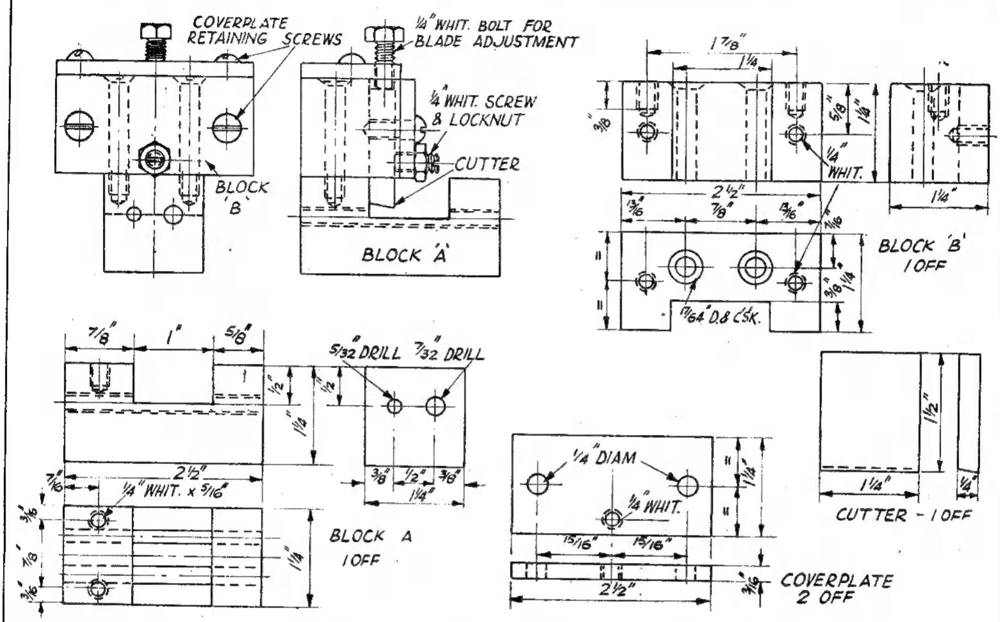
Useful dimensions

Wheels, 4 ft. 6 in. and 6 ft. 6 in.
Wheelbase, 7 ft. 9 in. and 8 ft. 3 in.
Overhang, leading 4 ft. 6 in. and 3 ft. 8¾ in.
Total length of frame, 24 ft. 2¾ in.
Boiler, 4 ft. 3 in. diameter by 10 ft. 10 in.
Firebox, length 5 ft. 6 in.
Cylinders, 17 in. by 24 in.
Steam pressure, 140 lb.
Heating surface, tubes, 1,080 sq. ft.
Heating surface, firebox, 100 sq. ft.
Grate area, 16¼ sq. ft.
Total weight, 36 tons 5 cwt.

Making Half-Round Beading

by Eric E. Guest

THE tool described here will quite easily make half-round brass beading of any length up to $\frac{3}{16}$ in. diameter, and needs no tricky machining, in fact, no part of the tool need be a precision fit. All parts could be of amateurs' workshops. This problem can be overcome by using the steel from a broken or worn-out file, and carefully grinding to size. In any case, it should be an easy fit in the 1¼ in. wide slot. The cutting angle is best found by



Details of the tool for making half-round beading

steel, but brass will be found easier to work with, although, perhaps, a lot dearer. Two pieces 2½ in. × 1¼ in. × 1¼ in. will be required. Take one piece and machine or file the ends square. Mark off for the 5/32 in. and 7/32 in. holes. Place the block on end and drill right through, slightly countersink on both ends. The slot should next be formed either by milling or filing, and should be cut a little deeper than half the diameter of the holes. Take the other block, machine or file the ends as before. Mark out for a slot 1¼ in. wide by ⅜ in. deep, which is to take the cutting tool. I have shown all pins to be ¼ in. Whitworth, but any size that is convenient could be used. Two "cover" plates are required, which could be made from some scrap plate. Mine were ¼ in. thick, this being to hand at the time, but thinner plates would do quite as well.

The cutter blade may present a problem, as tool steel of this size is not to be found in all experiment. The two blocks are held together by two countersunk screws 1½ in. long, as per drawing. Care should be taken that these screws do not break into the 5/32 in. or 7/32 in. holes that have already been drilled in the other block. Next, fit the two cover plates. The top plate takes a hexagon-headed screw that is used to apply pressure to the cutting blade. The front cover also takes a screw and lock-nut. Adjust so that the blade moves freely up and down.

To operate, the tool should be held firmly in the vice and a length of brass rod or wire is pushed through the appropriate hole against the cutter blade, and allowed to protrude about an inch. Take a firm, repeat firm, grip and apply slight pressure to the blade. Pull right through. Push the wire back, again, apply slight pressure and pull. The rod will soon be cut, or rather shaved, to a half section and quite true at that.

PRACTICAL LETTERS

The "Eureka" Clock

DEAR SIR,—I have read with interest the further letter (July 28th) from "Watchmaker," and note that he still adheres to his original statement, namely, that the degree of compensation of a balance can be adjusted by moving screws in or out. Though there is a certain amount of truth in this statement, it is subject to so many qualifications that it cannot be accepted at its face-value.

In the first place, it is not good practice to carry out adjustments in the manner described, as attempts to do so would probably lead to confusion, owing to the fact that mean time adjustments are also being disturbed. Furthermore, the parts are not adapted to adjustment by this method, as the usual form of screw has a short-threaded stem, only just long enough to pass through the rim, and, in good balances, the undersides of the heads are made slightly conical to ensure that distortion of the rim does not take place when the screw is properly tightened up.

After investigating the case mathematically, I find other and more serious objections, for the following facts emerge:

(1) If a pair of screws be moved outwards, the degree of compensation afforded by this pair will be increased in direct proportion to the increase in radius, *provided* that a neutral pair of screws is moved an equivalent amount inwards.

(2) If a pair of screws be moved outwards and mean time adjustment is effected by the hair-spring, the degree of compensation will *not* be increased, but will be *reduced by a very small* and negligible amount.

As the amount of adjustment possible is limited by the amount that screws at or about the neutral point (fixed end) can be moved inwards, it is obviously very small indeed as we have only the quarter screws (assuming that the balance is provided with them) at this point. The compensating screws cannot be moved inwards, and it would therefore be necessary to reduce their weight instead. As the latter procedure is very undesirable, our adjustment is limited to the amount that one pair of quarter screws can be moved inwards. It appears unlikely that it would be possible to increase the degree of compensation of a normal balance by more than about 1 per cent. by this method, whereas by moving screws round the rim very considerable alterations can easily be made.

I agree that the subject is large and some of its aspects are, perhaps, outside of the scope or interests of the large majority of MODEL ENGINEER readers, and it is for this reason that I hesitate to go more fully into the matter. If "Watchmaker" cares to communicate with me, I would be pleased to let him have the proofs of the above statements and, if the Editor is of the opinion that there exists sufficient interest in this subject, I would be pleased to contribute a short article on the balance and endeavour to clear up some of the mysteries in which this subject is shrouded.

Yours faithfully,

New Milton. GEO. H. THOMAS.

Fowler Ploughing Engines

DEAR SIR,—Apparently, if one wants to know anything about engines, just write to THE MODEL ENGINEER! Mr. Johnson's letter in the August 4th issue contains most valuable information.

Your editorial note of August 25th concerning Fowler single-cylinder engines records two engines at work which are at least 75 years old, more or less contemporary with the derelict "Papworth" illustrated on August 19th last year. I wonder if Mr. Lloyd noticed the final drive to the hind wheels: unless the engines are of the 6 or 8 n.h.p. type introduced about 1870, each hind wheel had one spoke much larger than the rest; on one side this spoke carried a pin locking it to a driving drum, on the other was fixed a friction band passing round the driving drum. The driver could adjust this band to allow the drive to slip on corners.

The earliest Fowler compound P.E. I have seen (No. 4505 dating about 1881) has no feed pump and only one injector, but I think a second injector has been removed. Later compounds had feed pumps and they are specified in a catalogue of 1909, but shortly afterwards many engines at least had two injectors instead. Two injectors would be characteristic of the period of No. 15347 (1920's).

I am very glad that you are publishing so much about traction engines and I hope it will lead to real models, i.e. bearing some likeness to their prototypes, being built. For example, there was a photo of a Davey Paxman T.E. having two guide bars: I think I am safe in saying that D.P. & Co. never fitted two bars to any type of engine, but only four or trunk.

Yours faithfully,

Ruardean. R. C. STEBBING.

Utility Steam Engines

DEAR SIR,—A very important contribution to the design of flash steam boilers has been made in your journal and subsequently overlooked, apparently even by Mr. E. T. Westbury in his recent comments.

The contribution in question occurs in Vol. 65, No. 1573, p. 15 dated July 2nd, 1931, in which "E.T." describes evaporation tests on three similar boilers, each containing 11 ft. of tubing respectively $\frac{3}{16}$ in., $\frac{1}{4}$ in. and $\frac{5}{16}$ in. outside diameter. Not only did the smallest tube in every instance evaporate more water and give a higher superheat, but in the maximum capacity test and when fired with a $1\frac{7}{8}$ in. diameter blow-lamp going flat out, it evaporated the astounding quantity of 27 cu. in. of water per min. at 500 lb. per sq. in. and high superheat. Since this equals about 94 lb. steam per hour it should be sufficient for a reasonably efficient engine developing 1 h.p.

Another very interesting flash steam plant, on account of its lightness and efficiency, was that made by Mr. H. H. Groves for an early aeroplane, fully described in your Vol. 28, No. 628, p. 441 *et seq*, May 8th, 1913. With 7 ft. of $\frac{3}{16}$ in. tube in the main generator, mostly

in longitudinal zig-zags and fired with a 1¼ in. diameter blowlamp, Mr. Groves found that he could evaporate 3 oz. of water per minute.

For another purpose I have recently constructed a replica of this boiler and lamp except that I inadvisedly increased the tube length to 11 ft. This has not increased the evaporation to more than 3½ oz. per minute at 500 lb. per sq. in. and high superheat. It is therefore a long way behind " E.T.'s " test with the same length and size of tube and an evaporative capacity nearly 5 times greater.

I am convinced that there is now too much heating surface in this boiler to be really effective and I am sure there is far too much in some of the flash boilers described containing 60 to 70 ft. of large diameter tubing. Has not " L.B.S.C." again and again said that it is not the area of the heating surface that counts but the amount of heat put into it that produces evaporation.

Anyhow, I am going to rewind my 11 ft. of tubing on " E.T.'s " lines, fire it with a 2 in. diameter blowlamp and see if I can get 1 h.p. out of the turbine that lives on the hot end!

Yours sincerely,

Sevenoaks. D. H. CHADDOCK.

CLUB ANNOUNCEMENTS

Bethnal Green S.M.E.E.

The last of our Summer Meetings will be held on September 15th, at the Institute, 229, Bethnal Green Road, when Mr. G. Kennion, who is a well-known authority on small locomotive construction of the " Live Steam " variety, will give a talk.

Our twice-weekly meetings in the workshop re-commence shortly, and further particulars will be given at the enrolment meeting to be held, also at the Institute, 7.30, on September 22nd.

Hon. Secretary: B. R. FOREMAN, 14, Talwin Street, E.3.

Romford Model Engineering Club

Forthcoming meetings at the Lambourne Hall, Western Road, Romford, commencing at 8.0 p.m., Thursday, September 15th, Mr. S. W. Carr will give a talk on Walschaerts Valve Gear. Thursday, October 6th will be Competition Night.

Hon. Secretary: C. WILKINS, The Lodge, Woodward Road, Dagenham. Tel.: Rippleway 2871.

Harrow & Wembley Society of Model Engineers

A party of 24 members visited Longmoor Camp in Hampshire on Saturday, August 27th. The journey was made by coach to Liss Station, thence by special train to the Camp where the party was conducted over the ground by the Superintendent of the Line. This Camp, which has, in all, about 65 miles of track and 9 miles of main line was built during the 1914/18 war for the purpose of training army personnel in all matters relating to railway transport.

The tour was splendidly organised and was altogether a most interesting visit. Afterwards the party called at the " Anchor " at Liphook, the proprietor of which possesses a splendid collection of models of all descriptions including a 10 in. gauge railway in the hotel grounds. This visit was also well worth while and rounded off a splendid day.

On Wednesday, August 24th, Mr. W. Rogers, who recently gave members a practical demonstration of lathe work, brought a grinding-head along to the Heathfield School, College Road, Harrow, and dealt with the grinding of lathe tools and cutters, thus completing a series of two very instructive lectures.

Hon. Secretary: J. H. SUMMERS, 34, Hillside Gardens, Northwood, Middlesex.

Sutton Coldfield & North Birmingham Model Engineering Society

On Saturday, August 20th, a party of members enjoyed an organised visit to the " M.E." Exhibition in London. We afterwards visited Greenwich, and finished up at Kings Cross Station inspecting the " innards " of a Peppercorn Pacific.

We shall be holding our own exhibition in November.

Our future programme will include a visit to Bagnall's Engine works at Stafford.

All meetings at the Station Hotel, Station Street, Sutton Coldfield, at 7.30 p.m.

Hon. Secretary: C. F. PALMER, 77, Hartley Road, Kingstanding, Birmingham, 23.

Ickenham & District Society of Model Engineers

We have nearly completed 100 ft. of portable track in 3½-in. and 5-in. gauges, 75 ft. of which have been in use recently at garden parties and fetes. We are using the alloy rail by Fenlow Products and it is proving very successful.

Locos building are 5-in gauge " Maid of Kent," nearly complete, and an L.M.S. " 2 1 "; two 3½-in. gauge " Hielan' Lassies " and a G.W. " 1000 " class.

We are not overlooking " O " and " OO " gauges, and our aircraft section continues to grow. We would much like to see a boat section formed and welcome any prospective members. An entertainment committee is arranging a series of lectures, talks, cinema shows, etc., for the coming Autumn and Winter sessions and anyone interested would be made very welcome at our meeting place at Ickenham Hall, Glebe Avenue, Ickenham—Fridays, 7.30 p.m. Canteen facilities are available.

Hon. Secretary: H. C. PIGGOTT, 23a, Parkfield Road Ickenham.

Handley Page Model Engineering Society

On Saturday afternoon, September 17th, we are holding an " Open Day " at the H.P. Sports Ground, Cool Oak Lane, Hendon (near " Welsh Harp."). Visitors are invited to join with us on this occasion, when the car track and 3½-in.-5 in. gauge locomotive track will be available for the running of models. Also, the playing field will be available for the flying of control-line models. A small exhibition (restricted to our own members) will be held in the clubhouse.

Hon. Secretary: H. W. G. CROOKS, c/o Handley Page Sports Club, Claremont Road, N.W.2.

Derby Model Racing Club

We are holding the Derby Class " C " and Class " C " restricted hydroplane open events at Allestree Park, on Sunday, September 18th, 1949, and we shall be glad to receive entries as early as possible.

Practising starts at 11 a.m. and racing begins at 2.30 p.m. In addition to the open events, several club races will be staged, and weather permitting, we hope for a good day's sport.

Hon. Secretary: IAN W. MOORE, 2, Bridge Street, Derby.

The Coventry Society of Model Engineers

The above society is now holding its annual Exhibition until September 17th at the Sibree Hall, Greyfriars Green. The opening times are 2 to 9 p.m. except Saturday which will be 10 a.m. to 9 p.m.

The following meeting dates are:—Sept. 30th Exhibition Discussion, Oct. 14th Film night. Both at BTH club, Holyhead Road.

NOTICES

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. **All such correspondence should be addressed to the Editor (and not to individuals)** at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall & Co. Ltd., 23, Great Queen Street, London, W.C.2.

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Correspondence relating to display advertisements to be addressed to THE ADVERTISEMENT MANAGER, " The Model Engineer," 23, Great Queen Street, London, W.C.2.